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Scleroscope Hardness of Steel Balls

Widely Varying Results on Different Sizes—An Explanation of the Cause and a Suggested Remedy

BY ARTHUR L. COLLINS*

WHEN the scleroscope is used to measure the hardness of steel balls rather peculiar results are obtained. The old style instrument was used in the following tests, which had a diamond pointed plunger weighing 2.3668 grams and whose diameter of flat was 0.5 mm. In all cases the instrument was mounted on a 75-lb. anvil and repeatedly checked against a standard block to insure accuracy.

Several tests were run in different ways. All readings given are average figures obtained from three readings taken on each of 10 balls, the three readings on each ball being average, then the average of the 10 averages taken, giving the figure used. It is believed that this method gives as accurate results as could be obtained.

In operating the instrument, the ordinary precautions were observed, such as uniformity of pressure on the piece being tested and similarly of release of plunger by means of bulb. A magnifying glass was used to obtain greater accuracy in readings and the same person did all the reading. Before testing each ball was polished and, except as specially noted, it was the commercial product used in ball bearings.

It seems rather odd that a 7/16-in. ball should register 27 and a 1-in. ball 84 when it is known that both sizes were hardened and tempered properly so as to give maximum strength. Each ball was file hard, and one was three times as hard as the other—according to the scleroscope. But this we do not believe, and the problem involved therefore was to find out why this peculiarity exists and to discover some method to obtain an approximately straight line curve. And the method as discovered must be one which can be comparatively easy to apply commercially. Brinell and compression methods are tedious and ruin the ball for further use, but the scleroscope does not harm it for practical use. Details of the tests are as follows:

Test No. 1.—Balls resting on anvil of scleroscope, in same position as pieces are ordinarily tested:

Dia. in Inches	No.	Dia. in Inches	No.
3/16	85	5/16	51
3/8	81	11/16	58
5/16	79.3	3/4	65
3/4	51	13/16	73
7/16	27	7/8	78
1 1/2	34	15/16	82
9/16	44	1	84

NOTE.—Results of this test are shown in curve No. 1, Fig. 1.

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Test No. 2.—Balls same as used in Test No. 1, but annealed:

Dia. in Inches	No.	Dia. in Inches	No.
5/16	40.3	11/16	35.7
3/8	32.4	3/4	33.7
7/16	12.3	13/16	35.9
1/2	15	7/8	42.1
9/16	24.9	15/16	47.9
5/8	28.4		

NOTE.—Results of these readings are shown in curve No. 1, dotted, Fig. 1.

It can be seen that the form of the dotted curve is about the same as for the hard balls. Of course, we should expect it to be lower, because a soft ball is less resilient than a hard one and offers less resistance to the impact of the plunger. It seems that this peculiar form of curve may be due to one of two causes:

Curvature of the surface, or
Mass of the ball.

In order to investigate the first possible cause, balls from 5/16 in. to 15/16 in., inclusive, were annealed, cut in half, hardened and polished. They were then tested on the scleroscope to obtain readings which would indicate the influence of curvature of surface. Given the same mass in each case, those readings taken on the outside or curved surface would differ from those taken on the flat or inside surface, if the curvature had any effect:

Inside or Flat Surface			
Dia. in Inches	No.	Dia. in Inches	No.
5/16	65	11/16	36
3/8	60	3/4	48
7/16	55	13/16	65
1/2	50	7/8	60
9/16	45	15/16	76
5/8	43		

Outside or Curved Surface			
Dia. in Inches	No.	Dia. in Inches	No.
5/16	84	3/8	62
3/8	77	11/16	40
7/16	82	3/4	58
1/2	63	13/16	66
9/16	67	7/8	76
		15/16	70

These results are shown in curves Nos. 2 and 3, Fig. 2. There is a little irregularity in these readings which nearly always occurs when using the scleroscope, but, when the curves are drawn, both of them have nearly the same form, and this form is similar to that shown in curve No. 1 obtained on the regular balls. It is now apparent that the curvature of the surface at point of contact has practically no influence on the form of the hardness curve. It is to be noted that

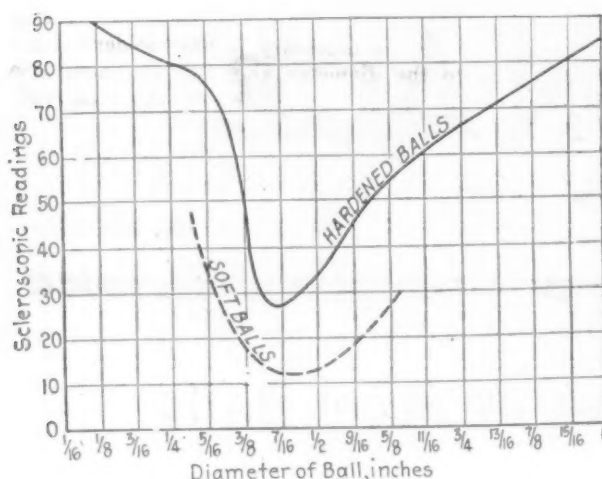
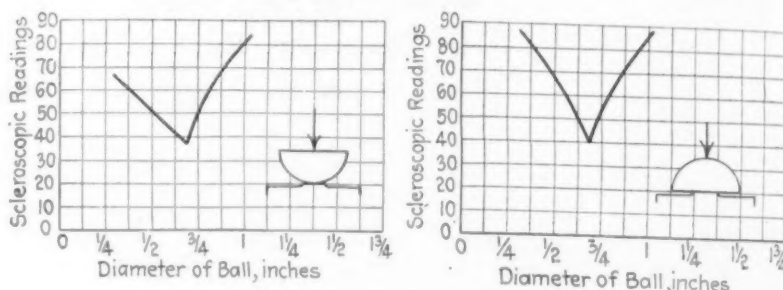


Fig. 1 (Upper)—Curve No. 1 Represents Scleroscope Hardness of Steel Balls Using Hardened Anvil Without Blocks

Fig. 2—Curves Nos. 2 and 3 Show Scleroscope Hardness as Influenced by the Curvature of the Surface



the readings taken on the inside or flat surface are nearly all lower than those taken on the outside or curved surface. An explanation of this may be that the inside was not polished as perfectly as the outside, which was done mechanically and was almost perfect. But it is also to be noted that higher readings were obtained in the case of the test on the outside and that in this case there was a larger area of contact of the piece on the anvil of the scleroscope.

To see whether the readings obtained on the smaller sizes represented the hardness of the ball or, if not, what it did represent, a thin strip of lead was put in place and tested. It showed a hardness of 83, which of course is unreasonable. It showed that the reading did not represent the hardness of the piece at all, but was really the hardness of the anvil that supported the lead. This then demonstrates one of the weaknesses of the scleroscope—the inability to accurately measure the hardness of small articles.

The conclusion reached is that the curvature of the surface has very little effect on the scleroscopic hardness, but the mass of the ball does have a large influence. We have just seen that the small balls reflect the hardness of the greater mass of the supporting anvil. But that does not help us out with the larger

sizes; it does not explain why a 7/16-in. ball, which is really just as hard as a 3/16-in., should register only 27 as against 85 for the smaller size. There is no way in which we can actually increase the mass of the 7/16-in. ball. But it seems that the form of the ball also has some effect because we obtained a higher reading on the half ball, when that half ball had a larger area of contact on the anvil of the instrument.

This brings in the subject of the force exerted by the falling plunger and the reaction of the ball to that force. If an imaginary ball be cut in the test block, it would register the same hardness as the block, and we know that the actual ball is just as hard as the test block. So we come to the conclusion that the cause of the peculiarity of curve No. 1 is mass-form and consequent reaction of this mass-form to the falling plunger. If we could determine how the force of the

plunger acts, what angles it takes, and properly construct a holder that would be sufficiently rigid to react against the components of the force, then we could get an accurate reading that would represent the hardness of the ball in all cases. The ideal would be a cup cut in a block and the ball would fit perfectly in this cup, and give rigid surface contact. As this is practically impossible, another method would be to give line contact in such a direction that it might give the same results by offering resistance in the proper direction.

Consequently, a series of blocks were made with cone-shaped hole cut in them so that the ball would have a line contact. The form of these blocks is shown in the illustrations. There were three sizes of blocks with a 60-deg. V cut, so that all sizes of balls up to 1 in. might be held. The reaction of the block to the force of the falling plunger transmitted through the ball must of necessity be at an angle of 60 deg. to the horizontal for all sizes of balls and would of course pass through the center of the ball, and the resultant would be vertical, in opposition to the force of the falling plunger. But whether all of this force was directed to the supporting block was the question and could only be decided by the results of the tests.

As will be recalled, there is a slightly raised portion on the anvil of the scleroscope and the flat series of blocks rested on this. The cupped series was made so that they would rest steadily on the anvil and not touch the raised portion. Therefore, the block must of necessity be vertical at all times, which would be necessary to obtain uniform readings. The blocks were made of tool steel, machined accurately, weighed and

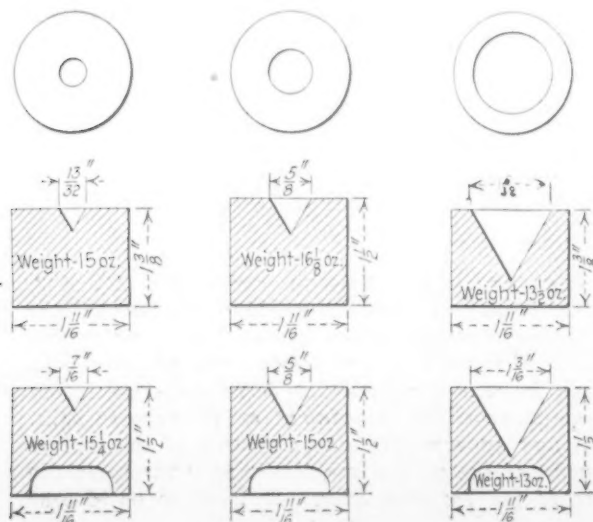
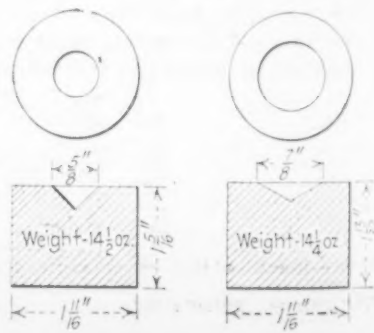


Fig. 3 (Left) — Series of Blocks with Cone-Shaped Holes Used to Determine Effect on Scleroscope Readings. These represent the three sizes with a 60-degree V cut in them

Fig. 4 — The 90-Degree and 120-Degree V Cut Block Used Similar to the 60-Degree



cups polished. It was believed that cups, polished and with a 60-deg. V cut, would give the best results, but blocks were also made with 90 and 120-deg. V cuts. Since these blocks would take up part of the strain exerted by the falling plunger, they would have the effect of increasing the mass proportional to the amount of strain they took up. Results of these tests follow and the readings are plotted in curves Nos. 4, 5, 6, 7, 8 and 9, Fig. 5.

Test No. 4.—Using a 60-deg. V in a soft block with flat bottom:

Dia. in Inches	No.	Dia. in Inches	No.
7/16	71.7	9/16	64.1
1/2	59.5	5/8	60.8

Test No. 5.—Using a 60-deg. V in a hard block with flat bottom:

Dia. in Inches	No.	Dia. in Inches	No.
7/16	70.5	5/8	70.7
1/2	68.3	11/16	76.1
9/16	70.1		

Test No. 6.—Using a 60-deg. hard block with cupped bottom:

Dia. in Inches	No.	Dia. in Inches	No.
5/16	76.2	11/16	67.9
3/8	67.9	5/8	69.8
7/16	38.4	13/16	73.1
1/2	43.5	7/8	79.1
9/16	47.7	15/16	73.3
5/8	58.1	1	72.1

These curves show that a part of the strain is taken up by the blocks, but only a part. There is still something lacking. The peculiar dip is not so pronounced. It is also to be noted that the dip occurs at about the same place with the use of a cupped bottom block. The flat bottom block gives more uniform results, perhaps because it is more rigid than the cupped block.

Test No. 7.—Using a 90-deg. V hard block with flat bottom:

Dia. in Inches	No.	Dia. in Inches	No.
5/16	77.9	9/16	68.8
3/8	84.6	5/8	69.8
7/16	79.9	3/4	72.5
1/2	69.2		

Test No. 8.—Using a 120-deg. V hard block with flat bottom:

Dia. in Inches	No.	Dia. in Inches	No.
5/16	74	9/16	52.1
3/8	65.5	5/8	39.8
7/16	61.5	11/16	47.1
1/2	53.1	3/4	67

It can be seen that in this case the dip is present, but the minimum point is not at 7/16 in., but is advanced to 5/8 in. It is apparent that this angle is not the one to go ahead with.

Test No. 9.—Using a 60-deg. V block with cupped bottom and each ball held in soft solder up to the diameter:

Dia. in Inches	No.	Dia. in Inches	No.
5/16	80.0	11/16	81.3
3/8	81.1	5/8	80.7
7/16	81.7	13/16	80.9
1/2	81.9	7/8	81.5
9/16	81.1	15/16	81.3
5/8	80.8	1	82.2

There is a maximum variation of 1.4 per cent from the average, which is as close as could be desired with a scleroscope. But it is evident that this method comes as close to the ideal as can be obtained practically, and it really does comparatively measure the hardness of the ball, whether it is large or small. The average of these readings is 81.13, which is a little low, but may be accounted for by the fact that the solder is not as rigid as steel would be. But the resistance is the same in each case, and consequently we get nearly a straight line. This is the result we had been after, and it is not difficult to apply this test as the solder

melts in boiling water and the ball may be seated before the solder sets. It is necessary to have solder around the ball up to the diameter and the ball must also strike the sides of the block in line contact or the reading will be very low.

To show the results obtained by the various methods let us take the 7/16-in. ball and see the different degrees of hardness observed under the different conditions:

	No.
Without any block, ball on anvil	27
60 deg. hard block, cupped bottom	38.4
120 deg. hard block with flat bottom	61.5
60 deg. hard block with flat bottom	70.5
60 deg. soft block with flat bottom	71.7
60 deg. hard block, ball held in mercury	79.9
60 deg. hard block, ball held in soft solder	81.7

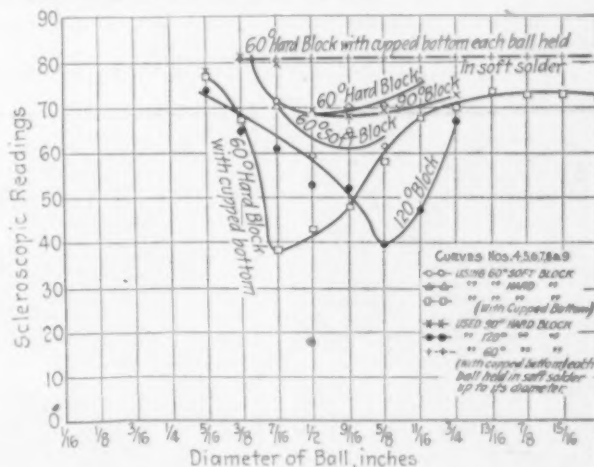


Fig. 5—Curves Nos. 4, 5, 6, 7, 8 and 9, Showing Scleroscope Hardness Resulting from Using Various Blocks

The Carroll Chain Co. to Manufacture Welded Chains

The Carroll Chain Co., Columbus, Ohio, has been incorporated to manufacture a complete line of welded chain. Capital stock to the extent of \$100,000 was promptly subscribed and ground broken for the erection of a modern plant. Entirely new equipment of late design will be installed as rapidly as the building progress permits.

The company contemplates the production of both re-weld and electric-weld chain, but will begin operations by confining the manufacture to the fire-weld varieties, giving special attention to steam shovel and dredge chains.

Daniel Carroll, president of the new corporation, is a pioneer chainmaker of Columbus and a man who has devoted an active life to the development of the chain industry. He was one of the organizers of the Columbus Chain Co. in 1900, which is now the Columbus McKinnon Chain Co. The treasurer is G. G. McAlister, who has had 17 years of association with the chain business. J. M. White is sales manager and secretary. He is well known among hardware jobbers, having covered a large territory in a selling capacity. He was associated with the Johnson Sales Co., Pittsburgh, for eight years, leaving it to assume sales duties with the Columbus McKinnon Chain Co. The company expects to be producing some varieties of chain within 60 days.

High Water at Pittsburgh

PITTSBURGH, Nov. 28.—Three days of rain here has created semi-flood conditions in the rivers, and some of the steel plants have been forced to suspend operations owing to the inundation. Soho works of the Jones & Laughlin Steel Co. is largely down as a result of this condition, only two of the ten open-hearth furnaces at that plant being in operation, while skelp mill activities also are affected. Unless there is an immediate change in the weather, it is probable that other plants along the rivers will be forced down.

Combination Bench Machine

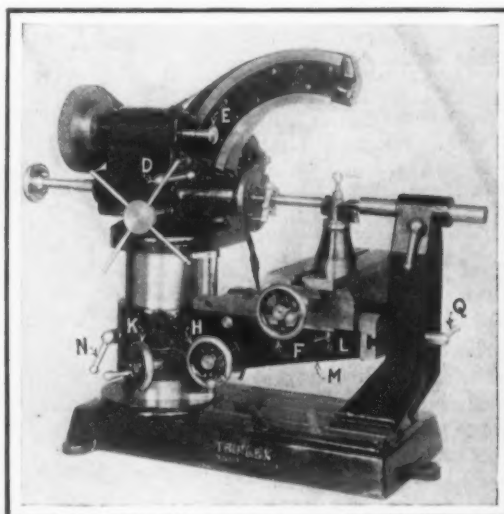
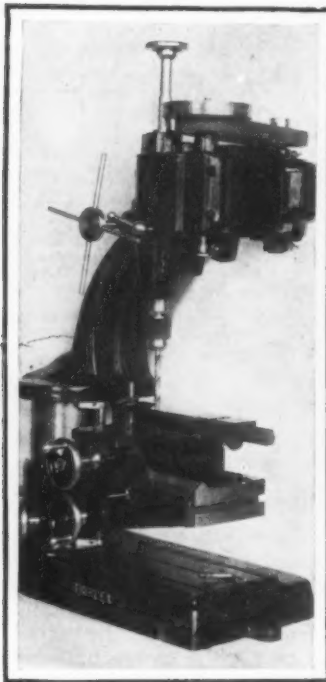
A new combination bench type machine, known as the Triplex No. 1, which combines lathe, milling machine and drill press, has been placed on the market by the Triplex Machine Tool Corporation, 18 East Forty-first Street, New York. The machine, as shown in the accompanying illustrations, is motor driven and hand fed throughout, with the exception of screw thread cutting. It is said to be adaptable to all operations that can be performed on the bench lathe, bench miller and drill press.

Any degree of angle can be obtained for milling, drilling and boring by moving the head upon the graduated arc, and the spindle can be fed out a distance of 3 in. by the handwheel. The latter feature is of advantage in milling and lathe work, as an extended spindle which can be locked in any position is often required to handle difficult jobs. The spindle is locked by lever D.

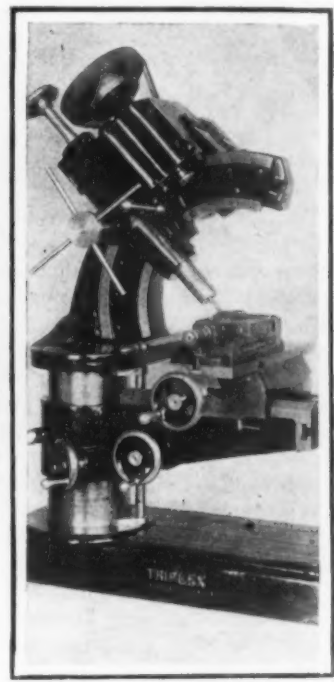
The motor is attached directly to the head, so that

units of a degree can be readily obtained. The clamping of the head on the radial arm is accomplished by tightening a single nut. The head is counterbalanced by a weight suspended in the hollow column and connected with the head by a steel cable which runs on pulleys.

Thread cutting is done by the master screw method, no lead screw being used. The work is held in a chuck or spring collet, and while the spindle is revolving the handle holding a nut segment is placed in contact with the master screw so that the spindle is thereby caused to feed forward, while the cutting tool remains stationary. At the end of the thread cut, the nut segment is thrown out automatically by the taper on the handwheel. The spindle is then returned to the starting place by the hand wheel. Internal threading is done in the same manner, by using an internal threading tool. The spindle head and motor are shown vertical in the left hand illustration, the machine being used as a drill press. The drill chuck used is a Jacobs No. 6, having a capacity from 0 to $\frac{1}{2}$ in. The spindle is



Any Degree of Angle Can Be Obtained by Moving the Head upon the Graduated Arc. View at left shows the machine as a drill press; view above, as a lathe. In the right hand view an end milling operation is being performed



power is supplied to the spindle when it is in either horizontal, angular or vertical positions. The motor used is a Holtzer-Cabot $\frac{1}{4}$ -hp. reversible, ball-bearing type, and runs at a constant speed of 1750 r.p.m. There are six spindle speeds, from 90 to 1150 r.p.m. Changes in speed are obtained by shifting the shaft E upon which three shifting gears are mounted.

When the machine is used as a lathe, as shown in the center illustration, the spindle holds either face plate, spring collet or chuck, thereby permitting a variety of tools to be used. The working table is 5 by 14½ in. The longitudinal feed is 10 in.; the transverse, 6 in., and the vertical 4½ in. The swing over the working table is 8 in. and over the ways of the bed 14½ in. The center distance is 14 in., maximum. The diameter of the milling arbor is $\frac{7}{8}$ in. and the spring collet capacity $\frac{1}{2}$ in. The bench space occupied is 16 by 26 in.; the height when spindle is vertical, 43 in., and the weight, 450 lb.

The handwheel F is used for transverse feeding, handwheel H for longitudinal feeding, and handwheel K for vertical feeding. Micrometer dials are attached to all three handwheels. The carriage can be locked in any position by the handle L. Tapers can be turned by moving the bed M to the right or left of the spindle axis and locking it by means of levers N and Q.

A separate illustration shows the head swung up at an angle and the end milling operation being performed upon the work held in the vise. The tailstock is removed. The end mill is held by a spring collet in the spindle. The radial arm is graduated in half degrees, which are spaced 1/16 in. apart, so that smaller

driven directly by gears, and a heavy cut can be taken when drilling. Vertical milling can also be done when the head is in this position. The bed can be swung entirely out of the way so that any type of work can be strapped to the base of the machine, which has three standard tee slots to accommodate $\frac{1}{2}$ -in. bolts. Horizontal, angular or vertical operations can be performed on work placed upon the base.

The machine is said to be rigidly constructed throughout, and to represent a complete equipment. In addition to its usefulness in tool rooms, experimental shops and shops having limited floor space, the machine is adapted for small production work requiring angular drilling or milling operations.

George L. Fairbank, president George L. Fairbank Co., Cleveland; F. W. Farnsworth, president, and K. F. Williams, vice-president, Chippewa Iron Mining Co., Cincinnati, have just returned from a visit to the Armstrong Bay mine of the latter company on the Vermilion range. They report the work is moving along more than satisfactorily. A good bit of the work has been completed on the railroad track connecting the mine to the main line. From present progress there is no doubt that the track will be ready for use by the opening of navigation in 1922. Work in the mine proper is going along in an excellent manner and new ore is being developed. The Chippewa Iron Mining Co., through its sales agent, the George L. Fairbank Co., will enter the shipping field next season. It is expected that about 100,000 tons of ore will be available for shipment next year.

The Transition to an Open-Shop Foundry

Methods That Have Been Used with Success
in Training Molding Machine Workers—
Increased Output the Aim, Not Low Pay

—BY PAUL R. RAMP*

A GREAT deal has been written about the open shop and its advantages over the closed shop, but very little if anything about the best and most economical plan for establishing an open shop. Every company should know whether or not it would be benefited by having an open shop and whether or not it wants one, because in making a venture of this kind it is well before starting to know what must be overcome. Very often it is decided to create an open shop without counting the cost, and there is considerable disappointment to the management because it was not fully informed as to the trouble that might be encountered.

The open shop requires more supervision and more efficient supervision than the closed shop, as it is necessary to teach unskilled men many things that are not thought of when skilled labor is employed. In foundry work the green man must have numerous practical demonstrations of the way to do his work. He must be taught how to hold his rammer, how to ram his mold, how to tuck his bars, how to place his gagers, how to draw his patterns, to place the cores in the mold, and many other details. Whenever it is possible to work a man on the same pattern for a long period he will soon learn his lesson and become a paying investment without continual supervision; but when it is necessary to change his work from day to day he will require instructions daily. His foreman must be more than a good mechanic to enable the company to realize a profit from the new man's work—the foreman must be a good teacher with an unlimited amount of patience.

As a rule, men who accept employment in an open shop with the idea of doing skilled work are very anxious to learn, and if the man in charge has in his make-up the ability to see in them his future mechanics, these men will be a success. It is well to bear in mind that the question of competent supervision must come first in the open shop. Many an attempt to establish such a regime has failed simply because the supervision was not equal to the occasion or leaned to the old order of things.

First, be sure your foremen are heartily in favor of this move, and that they are big enough to carry the load. If they are not, strengthen them by adding sufficient help of the right sort before proceeding any further.

Abolish Uneconomical Practices

One point that must be kept in mind is that the open shop will be of no value if the old shop habits are not made a thing of the past. The best plan is to establish working rules under the open shop administration, just the same as you would if your shop were an entirely new institution. For instance, if the molders have been in the habit of stopping work as soon as the blast goes on, and it is possible for them to keep busy until their iron is ready, make it a rule that they shall work until their iron is ready. This is possible. You cannot serve every molder with iron as soon as the blast goes on, and you are losing money when they follow the rule long established in foundry operation, to stop work when the blast goes on, and do nothing while waiting for iron.

This rule will not work a hardship on your molders, and if they are working by the piece they will be able to make more money for themselves while making more for you. If they are working by the day and do not produce any more by putting in the hour wasted

waiting for iron on the regular day's work, they should be able to produce a greater number of good castings for you and fewer for the scrap pile.

Another important item connected with the molders remaining on the floor until their iron is ready for them is that it deprives them of an hour's time usually spent in gossip and trouble making. The closer you can keep your men to the bench or floor the less trouble you will have. The open shop makes it possible to abolish the waiting-for-iron system and get more castings per man and better castings.

In the open shop it is possible to induce a man to do what he can in the way of a daily production rather than what some committee has decided is enough for a day's production for one man.

The open shop breeds loyalty to the company. If these men are properly handled they will appreciate that they have a better job than they ever had before. Instead of being influenced by shop committees to think that they must "beat the boss" at every opportunity, they will be encouraged by their foremen to feel that the company is their best friend.

Reduces Labor Turnover

While the establishing of an open shop means the hiring and discharging of a number of men in order to select the best material, after it is started the labor turnover will be much lower than in any other shop. One reason is that these men will hesitate to try another shop for fear they will be given work so widely different from what they have been doing that they will fail. Another reason is that when men are working under their foreman's instructions and producing what they can without being restricted by any committee, it is possible for the company to pay them more money than they can get in a closed shop; and it is rather difficult for an organizer to induce a body of men to join an organization that cannot guarantee them a greater wage than they are receiving.

It is possible to do better on difficult work with the right supervision in an open shop than in a closed shop. We have in mind a very large foundry employing over 800 men which produced all of its castings with green help, and made castings superior to those furnished by the union shops.

In the open shop it is possible to induce a man to produce what he can per day rather than what he wants to, which makes his pay check larger and gives the company a greater volume of castings from the same floor space.

An open shop is never safe with a considerable sprinkling of union men in it. There is always the great danger of the shop being quietly organized, and should you wake up some morning and find all of the handy men members of the union it is a sure sign that there is going to be trouble, because a new union man is harder to control than the old members who have gone through several battles and have learned to hesitate before they make trouble.

The open shop can produce in 30 days a molder as competent as 90 per cent of the molders of to-day, with the proviso that his work must be as near the same class from day to day as possible.

Starting in a New Worker

A great deal depends upon how a man is started, in developing molders out of green men. Very often a helper who has worked with a molder on certain jobs becomes able to handle the jobs himself; but this takes time. To fill a shop with unskilled men and get

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production in a very short time requires much patience and care. It is surprising how many men can be taught how to mold in a very short time by one instructor if he goes at this work systematically. One method that has proved very satisfactory is as follows:

Establish your prospect on the floor you have assigned him. Get his strict attention by explaining to him that you are going to make one complete mold for him and that you want him to see if he cannot make one without your help after he has watched you make one. Call his attention to the way you riddle the first sand on the pattern; how you tuck the sand around the pattern, if this is necessary, and why you do it; how you fill the flask with sand, being careful to make as few unnecessary motions as possible; how you ram around the inside edge of the flask first, to produce a solid joint for the cope part of the mold. Explain why a solid joint is essential. Show him how you avoid ramming over the high portions of the pattern, and tell him why you avoid this. Show him how to prepare a light bed of sand over the drag, after it has been struck off, to rub the board down on before the mold is rolled over. Explain to him why this bed is required and why it should not be excessive. Roll the mold over and call his attention to the way you take hold of it. If a parting is to be made, explain every detail of the operation, and to make it more impressive rap and draw out the pattern, which will enable you to point out the places that were not parted down far enough, or the places that were parted down too far. It is more impressive to make this demonstration right at this time while the parting is being made, than to wait until the pattern is drawn out in the regular order of things.

Place the pattern back in the mold and show how you correct the poor parting you have made. Shake or throw on the parting sand, at the same time instructing the learner as to the disadvantage of using too much parting or not enough. Place your gate pins and tell him why you locate them at certain points. Riddle on your first cope sand. Tuck around the gate pins. If gagers are necessary, place each one with an explanation. Give careful instruction as to tucking bars. Fill the cope flask with sand and ram at the same time. At this time teach the difference between the pean end of the rammer and the butt; when they should be used and why. Strike off the cope mold and enlarge upon the necessity of making a clean, smooth funnel for each down gate after the gate pins have been drawn out. Many are taught to make a clean mold and not how to make a clean gate. Show how you hold the vent wire; how you vent the mold; where you vent the mold and why. Give the prospect a lesson in detail on how to take hold of his cope to lift it off; how to lay it back; how to blow out his down gates; how to finish the cope; how to brush off the joint of the mold; how to swab around the pattern; how to rap the pattern; how to draw it. Teach him carefully how to get the feel of the pattern as it comes out of the sand. If there are any cores to be placed in the mold, make a lesson out of each core. Show where the vent escapes from the core and how to provide a corresponding passage for the escape of this vent gas from the mold and why. If the cores must be nailed down or held with chaplets, go into detail about it. Cut the gates, explaining how important it is that the gate passages must be soft and clean. In doing this it is well to teach the worker how to hold his hand in patting down the gate surface. Do not fail to make him understand that the gate is the most important part of the mold. Close the mold for him and tell him you want him to make one just like it for you. He will start off and probably get his pattern properly located on the follower board but will place the drag section of his flask on the follower board upside down. Call a halt, and tell him he has forgotten something but do not tell him what it is, and do not let him proceed until he has discovered the mistake himself. Sometimes it requires several moments for your man to discover his mistake, but when he does he never forgets it.

After he has corrected this error allow him to proceed until probably he neglects to tuck the riddled sand

around his pattern. Stop him and hold him again until he finds the trouble. Remember, this is his first attempt to make a mold, and you have given him a great many instructions that will be hard for him to remember; but with your patient promptings on the first mold he will absorb sufficient knowledge to enable him to advance much more rapidly than if he does not receive this personal attention.

Going It Alone

After your man has completed this second mold, his first one, tell him you are going away for an hour and that he must work out his own salvation. While you are devoting this hour to teaching another group of men similarly, he will be making mistakes and correcting them himself. If he is ever going to be a molder you will see a decided difference in the way he goes to work at the end of the hour. We do not mean that you can make a molder in one hour, but if your instructions have been clear you will be able to tell in one hour whether or not he is the material you want.

This plan is of no value unless you teach your man the very best way to work, but we believe there is no better way to develop men that will become self-reliant quickly and grow through their own efforts.

The above example of how to teach these men may be a little overdone, but the principle involved is the same. In case of molding machine work there would be fewer details, but they should be taught with just as much patience if results are to be obtained.

A very good plan by which to qualify men quickly is to divide the work, giving one man the drag part of the mold to make; another the cope part of the same mold and teach another to place the cores. It will not require as much instruction to get three men producing this way.

Simplifying the Work

The greatest item in the open shop is to make the work simple. It is decidedly expensive and a slow process to try to teach unskilled men to mold after the methods used by molders who have served years at the business; and it is here that executive ability makes itself known and felt. A surprisingly large percentage of the most difficult pieces can be made simple jobs if the foundryman and the pattern department get their heads together. They can cut out drawbacks or loose lugs on the patterns and use cores. They can furnish special gates for the molds so it will not be up to the unskilled man to learn how to cut a gate. They can provide flasks that do not require much skill to ram up; but with it all they must personally teach their men how to do things. We have known of foremen who have kept handy men at work for six months endeavoring to teach them how to mold, when a three-day trial should have been sufficient to show that they would never make a success at the business. Be sure you have given the new man a chance; be sure you have taken the time to teach him the why of every move he makes, and if he does not improve with every mold you have the wrong man and you are wasting your time and the company's money by keeping him.

Not a Low Wage but Increased Output

The successful open shop does not mean the shop paying a low average day rate, but rather the shop with an increased production per man. The serious objection to the closed shop is not the high wage rate but the restriction of output per man. It is not advisable to allow the wage earned by the open shop to be lower than what is received in the closed shop, but quite the contrary. This is very important in keeping the shop open, and if proper steps are taken to secure a reasonable production from each man the wages paid will not work a hardship on the employers. It is not unreasonable to expect a 100 per cent increase in production in the open shop over that of the closed shop on many jobs.

All work should be placed on a piece work basis, with the prices fair to both parties. No man should be paid for defective or spoiled work for which he is

responsible. This plan will give the company a good production of good castings and enable it to pay its men a good weekly wage, which will no doubt be greater than they could receive in a closed shop where piece work and bonuses are prohibited. It must never be a question as to how much too high a man's wages are, but rather what does the work cost per pound. The fact that we are working unskilled men who have never received higher than laborer's wages in the past must not influence us to believe that they will be willing to work at a low rate indefinitely, and it is advisable to raise their pay just as quickly as the company can afford it, thus making it impossible for any outside influence to affect them.

Give nine men out of ten a chance to work hard and make good money and they will stick to the job just as long as you want them. A good plan in making piece rates in the open shop is to establish the price the company can afford to pay for good work and then find the man who can make money at that price. It is a mistake to ask men who are new at the business, "How much do you want for a job?"—even though they may agree to make it cheaper than the price you have in mind.

Rates Must Be Fair

Now that you have an open shop and you are your own shop committee and your own business agent, you must establish your own methods of making piece-work prices, and not at any time allow the old time plan of negotiating with the molder for a low price prevail. Such actions lead to discussions among your men on what should be paid, and discussion leads to collective bargaining, which will eventually create conditions in your shop that will become just as obnoxious as those endured in the closed shop.

The best plan is to pay a fair price which will give the company a profit and enable the workman to earn good wages, and after the price is made stick to it. Sometimes in the beginning it becomes necessary to discharge a man because he complains about a price on his work, in order to discourage any disposition on the part of the men to try to get fair prices raised. When you find that by honest effort a man cannot make good after you have tried a reasonable number of different men on the job, you must either simplify the job so it can be made for the price in question or raise the price. It is better to pay an increase in price to additional core-making rather than to molding whenever it is possible.

It is these little things so often overlooked by supervisors that prevent the employers from obtaining all the returns possible from the open shop organization; and if such details are not watched carefully from day to day it will be only a question of time when the new gang will not be doing any better than the old organization in the closed shop.

Start with Unskilled Men

When the open shop has been established, it is the general idea that the work is going to be produced by unskilled labor and that the unskilled labor is going to be taught how to mold, how to make cores, etc. Now, if instead of following out this plan, the supervision calls into the shop all the men that are outside of the union and have had experience the results will not be as satisfactory. While many of these men outside of the union are good, there is also loafing around, looking for a job in the "struck" shop, an element that has been a complete failure at the business and whose presence among your new men or rather your students will cause you a great deal of trouble. While not qualified to produce good castings, they will set out to inform your men how much they ought to do and how much they ought not to do. When it is possible, and often it is, it is an advantage to hire men who have never been inside of a foundry rather than some that have had experience. This plan keeps all the old rules that cost the company so much unnecessary expense from again creeping in.

The molding machine plays a very important part in the open shop, but it must be remembered that no molding machine will be a success without the man behind it. The flask equipment must be right; the

patterns must be as near perfect as possible, and special care must be taken to have the patterns made so that they can be molded in the most simple manner.

The open shop plan is the best for any company with an investment in a foundry. The company is able to compete with others in the same line of work; to figure intelligently on the possible cost of its castings in making estimates. It has a chance to make a profit and to pay its men good wages simply because they are getting the production. With an organization of so much value it behooves every one interested to watch it carefully from day to day, because human nature is the same the world over, and without the right discipline, which should be strict but not at any time overbearing, there is only one thing to expect of the open shop and that is absolute failure to get the results to which the investment is entitled.

New molders or students must be helped daily, not simply by teaching them how to mold but in the more important lesson of loyalty to the company. It is interesting to watch men develop in a shop of this kind. Nearly all go through certain stages. Some get to the point of dependability very quickly, while others advance slowly. But regardless of speed they all are subject more or less to certain mental conditions that change their attitude toward their employers from time to time. We must be students of human nature and give the right kind of help at the right time.

Mental Reactions of the Worker

For instance, the fellow you have selected as one of your future mechanics may be honest, earnest, hard-working, and desirous of learning a trade, and for some time he will take great interest in all you tell him. He will have many heartaches over his failures. At this time he needs your encouragement, and you cannot afford to lose patience with him. A little later he becomes able to do good work. Then his brain begins to work along another line and he thinks he has discovered that he is a very good man and is not getting the consideration due him. While he is in this frame of mind he will either sulk or begin talking to others and make them dissatisfied. He needs your help at this time, just as much as he required it in the beginning, and you must use strenuous methods to get him lined up or you will be obliged to discharge him. Take him in the office and convince him that he is only in the primary department of the business and that he is of no special value to you; that he needs you more than you need him. You can finally settle with him by giving him a certain task to do and agreeing that when he can do this task satisfactorily you will pay him more. You are losing nothing and are helping him to realize that he has a great deal more to learn; and as he goes at the work laid out for him his mental condition will gradually change and you have a good man who will give you no more trouble.

Always remember that the men that are the most active are the men that are going to do the most toward making your open shop a success, but that as a general rule the fellows that are full of pep are the hardest to handle. Some of them may be led. Any of them, at times, must be driven up the grade. But you can make good men out of them. Force them to make good wages for themselves and profits for the company. Your labors are not finished when you have developed a shop full of good men. It requires just as much care and labor to keep a good man good as it does to make him that way. You baby men and you spoil them, or you treat them unjustly and lose their loyal support in the enterprise that means so much to the company.

Mistaken Consideration

It is a serious mistake to allow men to do only half a day's work because they did not go out on a strike with others. It is true we should be loyal to them if they have been loyal to us, but we are not benefiting them if we allow them to become a loss to the company. If we feel that they should have some extra consideration for their loyalty it will be better to pay them a higher rate of wages and insist upon them doing a

good day's work like every other man in the shop. These men should not be allowed any special privileges over other men in the shop. With the open shop you are building as nearly as possible a perfect organization, and it is costing money and time, and it would be decidedly foolish and expensive to allow anything to interfere with the progress of the work.

The open shop is the best for the workmen because they are able to make better wages. It is better for the employers because they are able to receive a greater production of good castings per man; but the big thing to bear in mind is that it must be kept open and free from all the things that for years have interrupted progress in the foundry. This means that a careful study must be made of molding methods, coremaking, patternmaking and human nature daily.

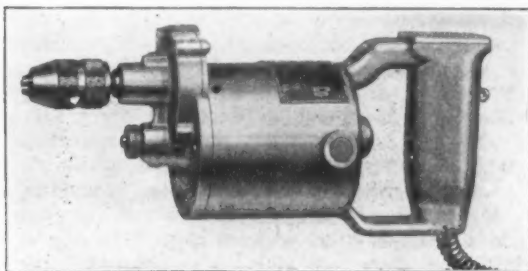
Hearings in Pittsburgh-Plus Case

WASHINGTON, Nov. 29.—Gathering of evidence by the Federal Trade Commission in the so-called Pittsburgh-plus case has proven to be a greater task than the commission had expected and as a result the proposed time for beginning now is set for early in January. Originally it had been intended to start hearings in September. Evidence still is being gathered in different steel centers of the country and it is stated at the office of the commission that there remains a considerable amount to be obtained. It is believed that the hearings will begin in Chicago and then shifted to other steel producing centers and it is possible that other proceedings may also be held in Washington.

H. E. Steinhauer, who has charge of gathering evidence, will be the trial attorney for the commission, but the name of the examiner has not been announced. While the chairmanship of the commission will change on Dec. 1, when Nelson B. Gaskill will succeed Houston Thompson in that position, this is not expected to have any bearing on the case. Importance is attached, however, to the filling of the existing vacancy created by the expiration of the term of John Garland Pollard. George W. Upton of Ohio has been named by the President to succeed Mr. Pollard, but no confirmation has been made by the Senate for reasons not known. Inasmuch as the commission as it now stands has two members who favor issuances of the complaint in the Pittsburgh-plus case and two who oppose such action, it is apparent that the attitude of the new member, who could be the deciding factor in a decision, or could ask for a review of the case, is important.

New Portable Electric Drill

The Lovejoy No. 3 electric drill is a new portable drill, which has been put out by the Lovejoy Tool Works, manufacturer of railroad and boiler makers' supplies, 319 West Ohio Street, Chicago. This tool is noteworthy because of its strength and compactness



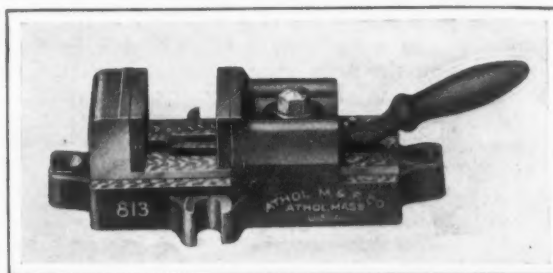
The Switch Is Arranged to Operate by the Thumb

and will drill a one quarter-inch hole in one quarter-inch steel. It weighs only four pounds and is furnished with either a 110 or a 220-volt motor suitable for either direct or alternating current. The switch is conveniently arranged to operate by the thumb. The drill can be held in one hand and has the additional advantage that the drilling point is always in plain sight of the operator. The tool has ample ventilation, has bronze gears and bronze bushings, with adequate provision for oiling.

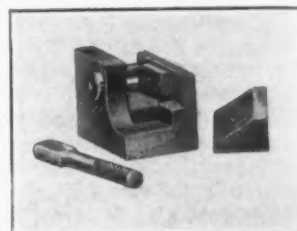
Drilling and Milling Machine Device

A drill press and milling machine vise with the movable jaw operated by a lever, one movement only being necessary to open and close, has been placed on the market by the Athol Machine & Foundry Co., Athol, Mass. The vise is shown in the accompanying illustration. It is designed to facilitate the rapid drilling or milling of small work, the range being from 1/16 to 5 in.

The bed is of cast iron and is 10 in. long, 6 in. wide and 2 3/4 in. high, overall. Four lugs are provided for clamping to milling machine table or drill press bed, keyways in the base being provided also for use in this



Special Jaws Adapted to the Particular Work Give the Maximum Results. A special jaw is shown at the right



connection. The jaws are 3 in. wide, of cast iron and substantially built. Hardened steel plates are held in place by 3-in. screws on the front and by 1 1/4-in. screws on the back jaw. The lever is of cast steel and acts on a 3/4-in. steel bolt and nut. The vise weighs 10 1/4 lb. complete.

The vise can be used to advantage with plain jaws, but with special jaws adapted to the particular work, production, it is claimed, can be increased up to 75 per cent, according to the nature of the work. Special jaws can be made by the user, or furnished by the Athol company.

New Heavy-Service Hand Truck

A heavy-service hand truck, the frame of which is of one piece and pressed from 1/4 in. hot rolled open-hearth steel, has been put on the market by the Sharon Pressed Steel Co., Sharon, Pa. It is called the Blue-nose, from the steel blue color of its nose, and is made in two sizes: 54 in. long by 18 1/2 in. at the nose and 64 1/2 in. long by 23 1/2 in. at the nose. The weights are 63 and 120 lb. respectively.

The frame is reinforced with beads and flanges at points of extra strain and the wheel lugs, which are integral with the frame, are stiffened by 1/2-in. beading pressed in. The nose is pressed from 1/4 in. steel and has flanges at the corners to prevent springing when lifting a load. The footings are of pressed steel and are braced. The wheels are housed within the frame and the axle supported in lugs at four points. The truck is equipped with malleable iron wheels with plain or roller bearings or with cushion wheels and the handles are of steam-bent oak, held by lag screws.

C. C. Chesney, general manager General Electric Co., Pittsfield, Mass., spoke on the 1,000,000-volt transformer developed recently at that plant, and Charles P. Perin, New York, consulting engineer, on the Electrical Development of India, at a meeting of the Engineering Society of Western Massachusetts, held on the evening of Nov. 22, at the Weldon Hotel, Greenfield, Mass. Members of the Engineering Club of the Greenfield Tap & Die Corporation were among the guests of the evening.

Pratt & Whitney Full Automatic Lathe

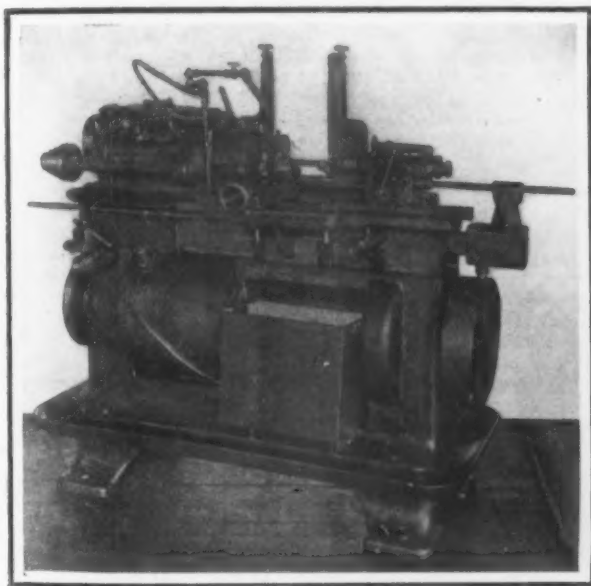
A new line of engine lathes entirely automatic in their action, taking from a magazine and gripping the work, turning one or more diameters simultaneously, and ejecting the finished piece independent of an operator, has been placed on the market by the Pratt & Whitney Co., Hartford.

The machines are designed for quantity production, handling cut lengths of bar stock or forgings that must be turned on centers. As the operator has but to replenish the magazine and keep cutting tools in condition, he may tend a battery of machines, the number of which depends on length of cut and stock removed.

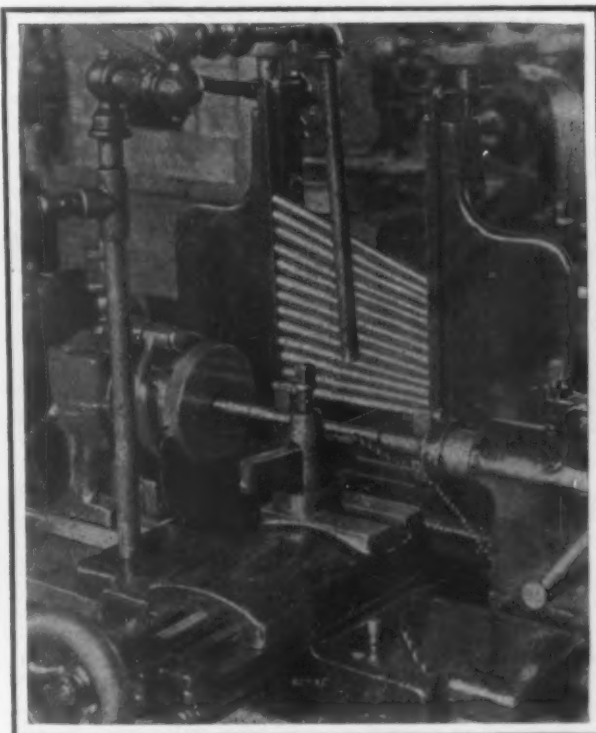
The general features of the engine lathe are present in this design. Centers are provided upon which work is mounted while being turned; a driver rotates the work, a carriage is provided with the usual cross slide adjustments and a tool post, in which may be inserted any form of standard tools. In place of the lead screw a drum cam is employed for the carriage traverse. This cam in common with the other cams on the machine is mounted on a heavy shaft extending the entire length of the bed. Adjustable dogs are pro-

movements is as follows: The carrier moves forward presenting the work in alignment with the centers, the footstock center then moves up pushing the work between the jaws of the driver or chuck and in contact with the live center. The carrier then withdraws and the next piece of work drops into place on the fingers. The driver grips the work and the carriage moves the tool to the cutting position. The cam shaft has two speeds and the foregoing movements all take place during the high speed rotation, an arrangement that reduces lost time. Adjustable dogs on a cam located at the headstock provide a means for timing the cam shaft to suit the length of cut.

The driver or chuck is provided with three cam shaped jaws that open by friction operated by a cam on the cam shaft. The jaws close on to the work through the action of coil springs when the friction is relieved. The hardened contact surface of the jaws is shaped so that the greater the resistance caused by the cuts, the harder the jaws will bite. The smooth contact surface of the jaws prevents scars on the work. The mounting of the chuck on the spindle nose provides lateral float, thereby eliminating side strain on the centers. Slight variations in length of work



Geared Head Full Automatic Lathe. Work is fed from the magazine, a close-up view of which is shown at the right. The lower piece of work in the magazine rests on work carriers and is held in place by fingers



vided which may be arranged to produce the length of cut on the work in hand.

The machine is shown in the accompanying illustration. The carriage is mounted on an extended portion of the front ways of the bed, thus providing space for the work to drop from the center, when released, to the removable can below. A jointed taper bar mounted on a bracket in front of the carriage connects, by engaging rolls, with the cross slide of the carriage, enabling taper work to be turned or continuous cuts partly taper and partly straight to be made. By the substitution of suitable former bars irregular forms may be turned.

Two sizes are made fitted with either a cone or geared head drive. The work is fed from a magazine on a bracket attached to the rear of the bed, the magazine consisting of two uprights adjustable toward and from each other to accommodate short and long work. Two guides on each upright are adjustable to suit different diameters. The lower piece of work in the magazine rests on work carriers and is held in place by yielding fingers that depress and allow the carriers to withdraw after the work has been placed upon the centers. A friction joint is placed in the train of levers actuating the magazine feed mechanism so that in case of accidental displacement of the work the mechanism will not be damaged. The sequence of

and depth of center holes is taken care of by a slip ring actuating the footstock spindle to insure pressure on work before the spindle is clamped.

The tool being advanced to the cutting position, the speed of the cam shaft changes from fast to slow and the turning operation is carried through to completion. At this point the cam shaft is again speeded up; the chuck is opened; the tailstock spindle withdrawn and the work dropped out. The carriage is then moved to the extreme right of its travel and then a new piece of work is presented to the centers.

The geared head machine has four spindle speeds direct drive and four reduced speeds through back gears. Four changes of feed for each spindle speed are provided on the large machine and three on the smaller one. The hand lever at the extreme left of the bed in the geared head machine illustrated is used for shifting the cam shaft from fast to slow or vice versa, at the will of the operator. The same lever serves to disengage the power for hand manipulation when setting up. The squared shaft located below the lever is engaged by a hand crank for the purpose.

The length of work accommodated is $3\frac{3}{4}$ to 15 in. and $2\frac{1}{2}$ to 11 in. in the large and small machines respectively and the diameters, $\frac{1}{2}$ to $1\frac{1}{2}$ in. and $\frac{1}{4}$ to $\frac{3}{8}$ in. The maximum traverse of the carriage is 12 in. and 8 in.

GOVERNMENT RESPONSIBLE

Decision Involving Pittsburgh Basis in War Days by Comptroller General

WASHINGTON, Nov. 29.—The application of the custom in the steel trade in establishing prices on an f.o.b. Pittsburgh basis has been held repeatedly to be improper and illegal where it relates to dealings with the Government, but where prices were so fixed during the war emergency by a Government price fixing board, the responsibility is that of the Government and payments under these circumstances must be allowed. This recognition of steel prices fixed on the f.o.b. Pittsburgh basis by the War Industries Board is made in a decision of J. R. McCarl, Comptroller General of the United States, in a decision just announced, in which, at the request of the Republic Iron & Steel Co., Youngstown, Ohio, he reconsidered and overruled the decision of Aug. 26, 1921, of the Comptroller of the Treasury. Another portion of the case relating to contracts never executed, but where material was supplied on procurement orders, remains to be settled upon presentation by the claimant of the actual orders.

The Comptroller of the Treasury affirmed the action of the Auditor of the War Department in disallowing in settlement, dated May 18, 1921, the claim of the Republic company for \$1,970.58 for freight differentials and in setting off against the remainder of its claim for retained percentages freight differentials amounting to \$18,638.02, paid to the steel company by disbursing officers for certain steel. The Comptroller General, concurring in the view of the Comptroller of the Treasury in another decision as to the responsibility of the Government in paying for steel on an f.o.b. Pittsburgh basis where prices were so fixed by the War Industries Board, applied it to the Republic case and made allowances on four procurement orders placed by the War Department with the Republic company and, modifying the previous action taken, certified that a difference of \$14,638.42 is due the claimant. This sum is made up of \$538.90 on freight claimed and disallowed in settlement and \$14,099.52 on freight paid by disbursing officers and offset in settlement. As a result of its finding, the Comptroller General orders a new settlement made and a war warrant for \$28,528.12 returned to the Republic company.

The claimant contended that as in the four procurement orders in which the prices named were f.o.b. Pittsburgh, there was contained the qualification "which is in accordance with the price fixed by the Government authorities," or "which is the price fixed by the United States Government for material of this class," and as the Government's fixed price was "f.o.b. Pittsburgh basis" as understood and used in the steel trade, it was entitled to be paid on that basis, under the decision of the Comptroller of the Treasury of April 1, 1919.

The claimant submitted copies certified by the custodian of the records of the War Industries Board of steel prices agreed upon by that board and the representatives of the steel industry, these prices having been approved by the President, and which the Comptroller General says were binding on the procuring departments of the Government, to establish its contention that the prices agreed upon were f.o.b. Pittsburgh basis and not f.o.b. Pittsburgh, as stated in the procurement orders.

The Comptroller General says the agreed prices submitted contain no specific reference to the term "f.o.b. Pittsburgh basis," and then quotes prices on iron and steel, copper and coke, as fixed by the War Industries Board. The decision says:

This schedule indicates that a distinction was drawn between prices f.o.b. a named point as in the case of copper, the price being "f.o.b. New York," and the prices fixed with reference to a basing point, as, for instance, steel bars, the prices fixed being based on Pittsburgh, that is, Pittsburgh basis. These prices were agreed upon between members of the War Industries Board familiar with the trade practices of the steel industry and representatives of that industry. All parties to the agreement seem to have understood and intended that the prices so fixed were f.o.b. Pittsburgh basis in conformity with the custom of the steel trade.

The application of that custom of the trade to dealings with the Government has been held repeatedly to be improper and illegal. (25 Comp. Dec., 406 and 679, 89 MS. Comp. Dec. 19.) But in the last mentioned decision the Comptroller of the Treasury indicated that where prices were so fixed during the war emergency by a Government price fixing board, the responsibility was theirs, and that payments under those circumstances would be allowed. I concur in that view and, applying it to the case in hand, allowances will be made on the procurement orders. * * *

British Steel Exports Expanded in October—Imports Still Heavy

British steel exports in October continued the upward swing recorded in September, according to the official data, just made public. The total was 161,683 gross tons, excluding iron ore and including scrap, which is over twice that for July or August. The September exports were 138,248 tons. Compared with October a year ago, the outgo was about 60 per cent of what it was then at 277,183 tons. The total for the ten months this year stands at 1,325,243 tons against 2,868,625 tons to Nov. 1, 1920.

Iron and steel imports in October were not as heavy as in September. The total, excluding ore and including scrap, was 189,536 gross tons, which compares with 188,875 tons in October, 1920, and with an average per month in 1913 of 195,264 tons. The following table shows comparative data:

British Steel Exports and Imports, Gross Tons

	Exports	Imports
Average per month first quarter, 1921...	183,373	186,040
Average per month second quarter, 1921...	109,670	96,320
Average per month third quarter, 1921...	93,804	160,727
July, 1921	61,001	103,561
August, 1921	79,163	149,231
September, 1921	138,248	229,391
October, 1921	161,683	189,536
Average per month, 1919	188,519	50,801
Average per month, 1920	274,881	128,685
Average per month, 1913	420,757	195,264

The trend of some of the principal exports is shown by the following data:

Principal British Exports, Gross Tons

	Average Per Month		Oct.,	Oct.,
	1913	1920	1920	1921
Pig iron	78,771	38,505	25,218	7,614
Steel rails	41,676	11,213	11,257	14,864
Steel plates	11,162	16,571	21,491	7,544
Galvanized sheets	63,506	34,244	29,196	32,222
Steel bars	20,921	30,322	32,260	10,711
Tin plates	41,208	29,418	36,204	25,356
Black plates	5,679	3,026	4,300	1,382
Steel sheets .....	.....	.....	12,044	3,758

Exports of steel rails have shown the most marked recovery in the above products with galvanized sheets and tin plates next.

Imports of pig iron in October were 92,544 tons, bringing the total for the ten months to 521,426 tons, compared with only 153,689 tons to Nov. 1, 1920. The present rate of imports is the heaviest on record.

Iron ore imports in October were only 140,508 tons, as compared with 541,742 tons per month in 1920. In October, 1920, they were 426,179 tons. The total for the first ten months of this year was 1,565,907 tons, as compared with 5,621,569 tons for the first ten months of 1920.

Manganese ore imports were only 3164 tons in October, which makes the total to Nov. 1, this year, 159,761 tons against 373,820 tons to Nov. 1, 1920.

To Make Manganese Steel Castings Electrically

The Electric Manganese Steel Co. has been organized at Reading, Pa., for making manganese steel castings in an electric furnace. A new plant is nearing completion at Fresh Valley, on the outskirts of Reading, and a Moore electric furnace is being installed. The main building is about 100 ft. by 40 ft. and is so designed that a 60-ft. bay can be added. Operations are expected to commence early in December. Ray Houck is president of the company.

Strain Lines in Low Carbon Steel

New German Etching Method Revealing Effects on Metal Which Has Been Stressed—Origin and Character of Lines

A NEW etching medium is described in *Stahl und Eisen* for Aug. 11, 1921, by Dr. A. Fry of Essen. It is claimed to bring out strain lines in low carbon steel which has been stressed. The copper-ammonium chloride etching method of Heyn shows the part rich in phosphorus as dark stripes on a clear ground, as shown in Fig. 1, which is a soft steel $1\frac{1}{2}$ mm. plate. Fig. 2 shows the same sample etched in the new way. Peculiar dark marks are seen, not brought out by the known etching methods.

The Etching Method

The method requires a preliminary heating of the steel for half an hour at 200 deg. C. The sample is then prepared by sawing, machining, filing and polishing, as with other methods, which for microscopic examination is polished as at present. The etching medium

immediately made dirty by copper deposits. If the surface is not clean it is rubbed with a little lot of chloride soaked in the solution and dried as mentioned above. By too strong etching the clearness is reduced. The sample must then be repolished. Also possible disturbances by too strong machining or grinding must be removed by careful polishing. After a little practice the method can be carried out without difficulty. With 10 to 20 hr. deep etching the strain lines in many cases are strongly brought out, but the delicate details are destroyed as shown by Fig. 3.

Origin of the Strain Lines

When amorphous materials are subject to pressure it is known that slip takes place along slip planes, the plane being at a certain angle to the direction of the stress, depending on the internal friction of the mate-

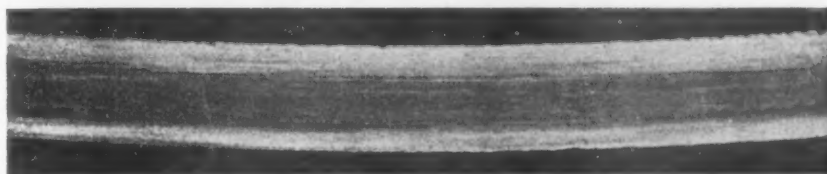


Fig. 1—A Section of Soft Steel Plate, Natural Size, Etched with Copper Ammonium Chloride

Fig. 2—The Same Sample of Steel as Fig. 1 but Etched with the New Medium

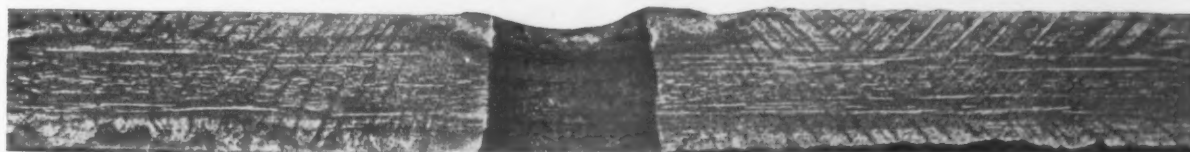


Fig. 3—Section of a Soft Steel Plate Containing Strain Lines Which Are Brought Out by the New Etching Allowed to Act Deeply. This is also natural size

consists of a strongly acid solution of copper chloride. The free acid is so proportioned that there is no deposit of free copper on the steel. The etching seems to take place by the deposit of copper-hydrogen compounds, that apparently change to an iron-hydrogen compound. Any copper deposits on the metal are quickly dissolved. For microscopic work the following solution has been used:

Concentrated hydrochloric acid.....	40 c.c.
Water	30 c.c.
Ethyl alcohol	25 c.c.
Copper chloride crystals	5 g.

The finely polished sample is etched a short time and if necessary is repolished and re-etched.

For macroscopic etching the method and solution are as follows:

Concentrated hydrochloric acid.....	120 c.c.
Water	100 c.c.
Copper chloride crystals	90 g.

In this solution the sample is etched 1 to 3 min., then taken out and etched further by rubbing well with a small patch of strongly soaked powdered copper chloride. The chloride is often renewed and repeatedly soaked in the solution. Rubber gloves are used. Etching usually takes 2 to 20 min. As soon as the lines are well developed the etching is stopped, the sample partially dried, rinsed off with alcohol and dried. Washing with water should be avoided, as the surface is

material. There is scarcely any doubt that in steel, slip plane formation is possible and further that these are responsible for the strain lines shown by the etching. Fig. 4 shows in section a block of soft steel into which a cylindrical stamp was pressed at room temperature. By a six hour heating at 730 deg. C. a recrystallized area was produced in the strongly deformed zone, that is clearly shown by the new etching. Further the etching develops dark strain zones that penetrate deep into the steel. If the lines of equal pressure produced by the stamp are worked out, then the curves are obtained shown in Fig. 5. The zones of strongest pressure, up to the line *c* can be considered as more or less totally deformed. As Fig. 4 shows, the greatest deformation is between the lines *a* and *b*. At the place of weaker pressure, *c* to *f*, the deformation appearance is only shown in separate slip lines, at an angle α to the local ruling direction of stress. As shown in the diagram this brings about bent lines, similar to those found by the etching in Fig. 4, which latter are therefore simply explained.

Fig. 6 shows the section of a soft steel block into which a ring-shaped stamp was pressed at room temperature and which was afterward heated for six hours at 730 deg. C. It was etched by the new method. In the vicinity of the impress the same appearances are seen as before. A clear recrystallized zone at the place of strongest deformation, then a completely darkened zone, and from this curved lines branching out.

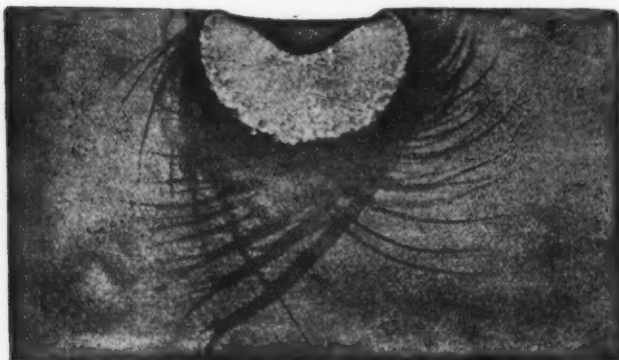


Fig. 4—The Pressure Effect of a Cylindrical Stamp in Soft Steel Revealed by the New Etching Medium. This is also natural size

Fig. 7 shows the longitudinal section of a bend test of low carbon steel, bent at 200 deg. C.

Character of the Strain Lines

These lines up to now have only been observed in soft steel, generally after the material has been subject to pressure. Further, after cold deformation alone they are not developed by the etching. A subsequent reheating to a suitable temperature is needed, for example $\frac{1}{2}$ hr. at 200 deg. C. From this it follows that it is not the actual plastic or elastic deformations that give the dark figures developed by etching, but secondary disturbances that are brought about through heating and are due to the strains remaining in the deformed metal. By heating to a temperature high enough to give solid solution the strain lines are completely removed. Also by heating to 600 deg. C. they

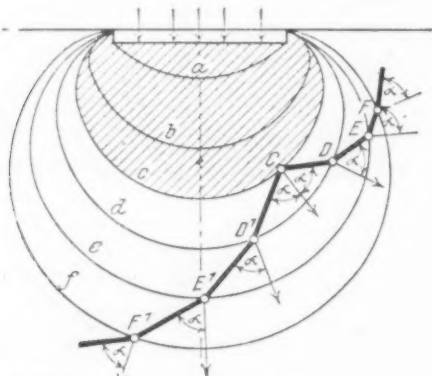


Fig. 5—A Graphic Representation of the Step Formation in Fig. 4

are made indeterminate in many cases, while in other cases several hours heating at 730 deg. C. leaves them clear and distinct. (Figs. 4 and 6.)

Microscopic examination was carried out to determine the nature of the disturbances shown by the strain lines, using the weaker etching solution. This investigation showed three kinds of structure disturbance:

1. In many cases a destruction of the crystals is visible. In the original crystals new slip lines may be seen, a fine example being shown in Fig. 8. This is a sample taken from a shock test at the place where struck by the hammer. The sample showed quite brittle under this test. Examination in the usual way with normal etching solutions showed no reason for the poor mechanical properties. By the new etching method slip lines were clearly seen, brought about by the influence of the blow. From these lines the size of the original crystals can be determined. Inside these lines new crystal junctions can be seen, usually independent of the slip lines, in irregular curves. These crystal destruction lines are undoubtedly closely connected with the fragility of this steel.

2. The crystal junctions etch more deeply and show up plainer than in the normal structure, so there has probably been some disturbance between the crystals.

It is probable that these changes have an important effect on the physical properties of the metal.

3. It was further determined that the dark color of the strain lines, and the macroscopic etching effect is not due to the breakdown of the crystals and the disturbance of the crystal junctions. It is caused by extremely fine disturbances in the interior of the crystals. All three classes of stress effect seem to be brought about under the same conditions, and do not differ in their effects on the steel. Crystals with this third kind of disturbance do not generally show any clear indication under the microscope even at the highest magnification and even where very clear strain lines are seen macroscopically. It is an indication that the derangement is between the very smallest particles of the crystals. Careful examination seems to show they are microscopically fine slip phenomena, as shown in Fig. 9. The lines differ from true slip lines in that

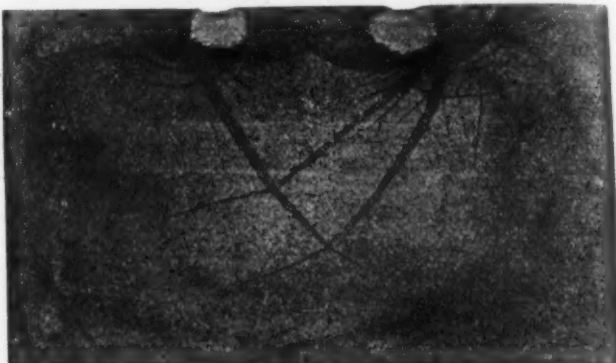


Fig. 6—The Pressure Effect of a Ring-Shaped Stamp in Soft Steel as Brought Out by the New Etching. The reproduction is natural size

they are curved. It is interesting to consider whether the space lattice of the crystals has been disturbed, which requires careful examination with x-rays. Fig. 10 shows the structure of a strain line at high magnification. The fine slip lines seem to depend upon the orientation of the crystals.

The darkening of the strain lines by etching is therefore satisfactorily explained by the microscopic work. A clear macroscopic structure is only seen when the last named disturbance is present, that is, slip line formation in the interior of the crystals. If deformation has brought about destruction of the crystals, or of the crystal junctions, then macroscopic examination will not show this, but they can be seen more or less clearly after etching with the weak solution and microscopic investigation. Many times all three kinds of disturbance can be found in one and the same piece. When it is remembered that they are brought about by the influence of stresses and low annealing temperatures it is evident that the same influences are present as with the well known brittleness of steel at a blue heat, and it is therefore evident that the latter is due to the same causes, namely, the three kinds of crystal



Fig. 7—Lines Formed in a Bend Test of Mild Steel Revealed by the New Etching Process. The piece is natural size

destruction outlined in detail above.

G. B. W.

Legal Tangles of Peace

The conclusion of peace with Germany brings new difficulties to the commercial world, or at least brings these difficulties to a point where their solution becomes imperative, for with the resumption of full trade intercourse between the countries the present status of all the numerous agreements of a commercial nature be-

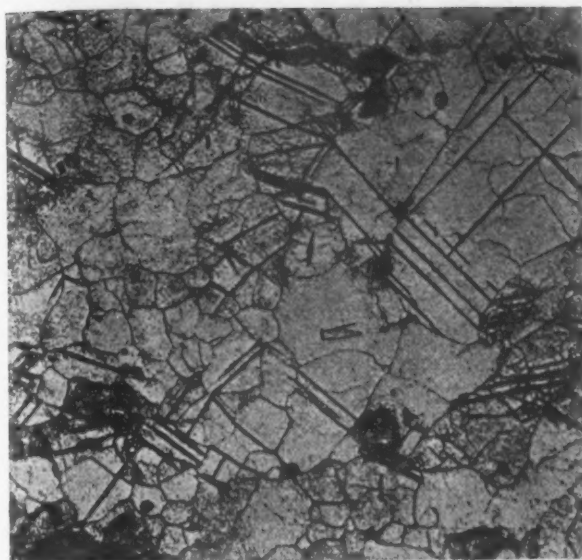


Fig. 8—Crystal Destruction with Slip Lines in a Piece of Steel Etched with the New Medium. Magnification 200 dia.

tween firms in the United States and in Germany must be determined. Which of these contracts was annulled by the declaration of war, and which only suspended? Is your foreign agent still your agent? Does your contract to buy or sell still hold good? Was your partnership dissolved by the outbreak of hostilities? These perplexing questions are discussed by A. J. Wolfe in *Commerce Reports* for Nov. 14 and 21, published by the Department of Commerce, Washington, in an article entitled: "Pre-War Contracts with Enemy Firms." In the concluding portion of his article Mr. Wolfe makes recommendations for the straightening out by arbitration of disputes arising from pre-war agency contracts.

Senator Kenyon's Unemployment Bill

WASHINGTON, Nov. 29.—Senator Kenyon of Iowa chairman of the Committee on Education and Labor, has arranged to begin hearings on his bill to relieve unemployment. The measure is designed to carry out the policy of the President's unemployment conference and to prepare in advance against future cyclical periods of business depression by providing for a long range planning of public works. The hearings are to begin shortly after the regular session of Congress, which convenes early in December. The Senator has not yet determined the list of witnesses who will be



Fig. 9—Slip Phenomena in a Strain Line Zone in a Section of Steel Etched Moderately Strong by the New Medium. Magnification 400 dia.

called, but it is believed that they will include delegates to the conference and State and city officials, as well as industrial and labor leaders not comprised in the conference.

Senator Kenyon has pointed out and has reflected in his measure the fact that a sound economic policy requires that a larger percentage of the public works and projects be undertaken and prosecuted during the period of major industrial depression and unemployment, when labor and capital are not fully employed in private industry. Supplementing this is the view that a smaller percentage of such works and projects should be undertaken and prosecuted during a period when private interests are active and competing for the same men and material, with resulting business strain and over-expansion. It is pointed out that this prosecution should be utilized as a stimulating force during a period of over-expansion, as well as during a period of depression.

Provision is made authorizing the head of each executive department to prepare and revise periodically all necessary plans for public works, in order that the work might go ahead without delay, once Congress has determined upon an appropriation. The Secretary of Commerce is authorized to publish monthly reports concerning the trend of business conditions in order that the President, the heads of executive departments, the Congress, governors of States and mayors of cities, and persons engaged in private industrial enterprises,

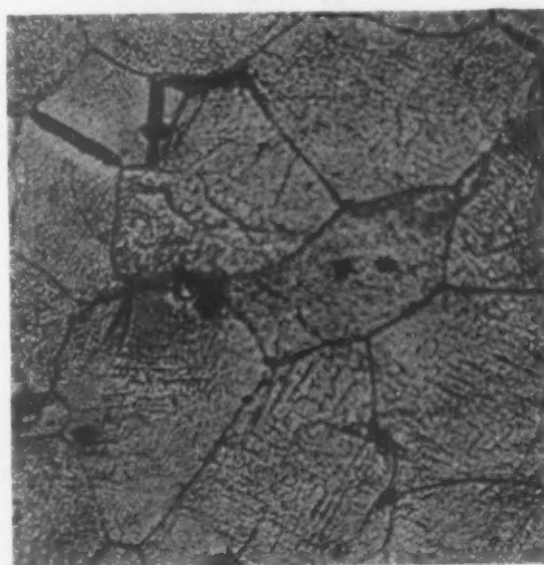


Fig. 10—Crystal Structure in Slip Lines as Revealed by the New Method of Etching. Magnification 1000 dia.

may prepare against business strain and over-expansion and business depression.

The bill of Senator Kenyon has been favorably received in Administration circles and has been indorsed by a number of members of the President's unemployment conference. Among them are Secretary Edward Eyre Hunt and Otto T. Mallery, member of the Industrial Board of Pennsylvania, and secretary to the Committee on Public Works of the President's conference on unemployment.

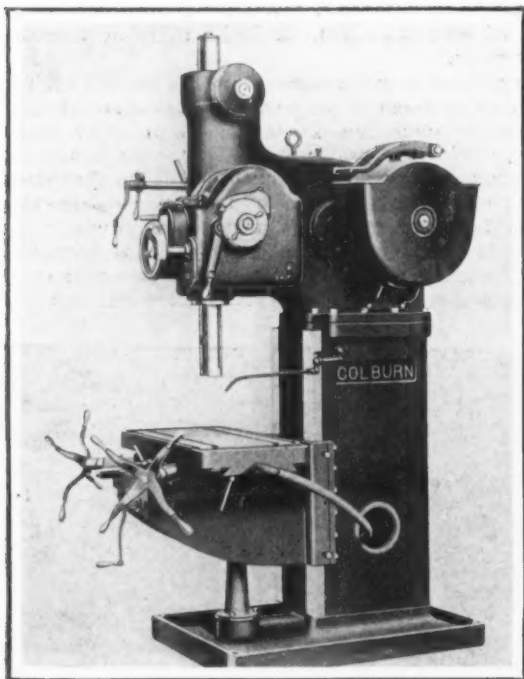
Minerals Act Signed

WASHINGTON, Nov. 29.—With the House accepting the Senate amendment eliminating the provision calling for re-appropriating of funds for claims, the liberalized war minerals act was passed on Tuesday of last week by Congress and has been signed by the President. The striking out of this clause, it is stated, will permit the reopening of claims which previously had been denied by reason of no "request or demand" and claims in which an earlier effort to produce war minerals can be shown. These claims, according to some members of Congress, if granted, will represent from \$12,000,000 to \$18,000,000.

Manufacturing Heavy Duty Drill Press

The Colburn Machine Tool Co., Cleveland, is offering a No. 6 manufacturing heavy duty drill press which, though essentially a production tool suited to the machining of duplicate parts in quantities, is said to be equally well adapted to handling a variety of work. A transposing gear arrangement provides a wide range of speeds and feeds, affording unusual flexibility.

The heavy box-type head; rigid column and table; the stub-tooth chrome nickel-steel drive gears, heat treated and hardened and running in a bath of oil; drive shafts of large diameter and short length; the use of ball bearings throughout the drive; and finally,



the location of the spindle driving gear at the lowest point of the head and on the large diameter of the spindle, are points of construction emphasized by the makers. Simplicity of control and ease of operation are also features.

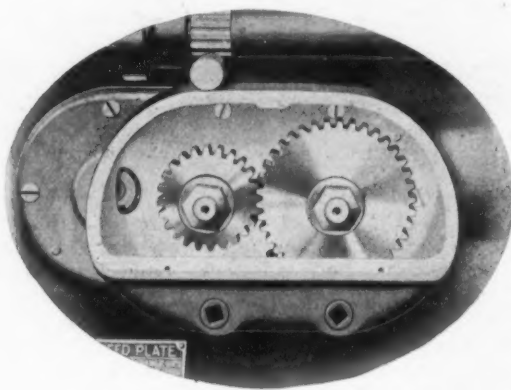
The machine is shown in the accompanying illustration. The capacity is given as 3 in. high speed drills in solid steel and the rated swing, 28 in. The distance from the center of spindle to face of column is 14 in., and the maximum distance from nose of the spindle to standard table is 36 in.; to the compound table is 30 in. The spindle travel is 18 in. The drive is through a constant speed belt to tight and loose pulleys mounted on the main driving shaft at the right of the machine. No countershaft is required.

All gearing is placed inside the head casting which is cored to form an oil-tight speed box. Speed and feed gears run in oil and journal bearings are lubricated by splash. Gears not running in oil are covered and provided with grease cups which deliver grease directly on to the teeth. All vertical bearings are lubricated by means of wicking which carry oil from the cored reservoirs around the bearings. The spindle has a No. 5 Morse taper and to equalize the strain is double splined. The quill or sleeve, made from 40 to 50 carbon steel, is bronze bushed and has rack teeth cut directly on its surface. A self-aligning ball bearing takes the thrust between the spindle and the spindle sleeve.

Two mechanical speed changes are provided which in conjunction with the transposing gear arrangement give 48 different spindle speeds ranging from 30 to 375 r.p.m. The mechanical speed changes are made by means of sliding gears located in the speed box and operated by a handle at the front of the machine. There are also two mechanical feed changes which, with the various transposing gears, give 36 feeds rang-

ing from 0.005 to 0.134 in. per revolution of the spindle. The mechanical feed changes are made with the worm feed hand wheel.

A single pair of speed-transposing gears is furnished, which together with the two sliding back gears give four spindle speeds. The speeds obtained depend upon the transposing gears used. To illustrate: With one pair of gears having 23 and 33 teeth, four spindle speeds can be obtained; 52, 104, 108 and 216. However, only two of these speeds are available at a time for quick change through the sliding back gears, and they would be in pairs, 52 and 104; 108 and 216. The machine is regularly equipped with one pair of feed transposing gears which, with the two mechanical changes, give four feed changes. The



Manufacturing Heavy-Duty Drill Press Equipped with Compound Table. A transposing gear arrangement provides a wide range of speeds and feeds, the small speed-transposing gear on driving shaft being shown above

feeds obtained depend upon the transposing gears used.

The machine is equipped with a plain table or a compound table, the latter being shown in the illustration. This is not an attachment to the regular table, but consists of a special knee with table having a rapid movement 20 in. longitudinally and 8 in. crosswise, obtained through a spiral worm and rack. The working surface of the table is 18 in. wide and 30 in. long. There are two T-slots, 10 in. from center to center.

A geared tapping attachment is furnished which consists of a set of friction clutch reversing gears having a reverse ratio of approximately $1\frac{1}{2}$ to 1. They are mounted on the driving shaft and driven by a single pulley. Safety and interlocking devices are provided. An automatic tripping mechanism can be set to trip the feed at any desired depth. A spring counterbalance for the spindle is a feature. No chain, cable, counterweight or sheave wheels are required. The tension can be increased or lessened to accommodate tools of different weight, and automatic return of the spindle after tripping at any predetermined point can be accomplished. A drilling compound pump is attached directly to the machine. The storage tank consists of a compartment inside the lower section of the column, openings on each side of the column affording access for cleaning.

When motor drive is used the motor is mounted on the lower part of the column at the rear and belted to tight and loose pulleys. A 10 to 20 hp. motor is recommended. A special extended base with T-slots and finished surface is furnished for work requiring greater distance under the spindle.

The No. 6 manufacturing heavy duty drill press is also furnished in gangs of two, three and four spindles.

Improved Methods of Rolling Sheet Steel

Possibility of Use of Continuous Mills or Other Labor-Saving Devices—Plant in Austria Rolling on Continuous Mill Before War

— BY SUMNER B. ELY.* —

PROBABLY the first iron plates were made by hammering, and must indeed have been a crude production. About 1725 or 1730, however, rolls seem to have come into use, although it was a number of years later before anything resembling a thin sheet was made. Yet from that day to the present the same general type of machinery has been used for rolling sheet steel. To be sure, our sheet mills of to-day, compared with the early ones, would appear giants in size and strength, yet after all what real difference is there except this increase of size and strength? We still have no continuous sheet mills—do not even use roller-driven tables, automatic guides, etc.—and practically everything is done by hand.

This statement may need a little qualification. Occasionally we do come across some small devices in use, such, for instance, as a hinged or pivoted table to assist the catcher in returning the pack over the top of the rolls to the roller. This particular device does not save any labor, in the sense of fewer men being employed; it is merely a help to the catcher. Some devices, such as shifting tables, and auxiliary attachments to cold rolls, may have a tendency to cut down the labor force; but after all such small helps as these are not real changes in the machinery of sheet rolling, and are far from being universally used.

It would seem, however, as if something might be devised to cut down the number of men needed about a sheet mill; a mechanical catcher, for example, which would automatically catch the pack of sheets as it came through the rolls, lift it up and return it to the roller again. Such a device would seem to be a mechanical possibility, and probably could be made to work successfully, but the amount of saving it would effect has apparently not been sufficient to act as a real incentive.

There is no doubt that to roll thin sheets of steel or iron is a most delicate operation, and its success depends upon many things. Occasionally a sheet mill roller says that the weather is not right to-day, and he cannot turn out a satisfactory product; which simply means that some detail is wrong, and he is unable to find what it is. One also hears stories from sheet mill superintendents that, after they had had the windows of the mill cleaned, the rollers would have trouble, until they accustomed themselves to judge the heat of the steel in the brighter light; and this one can readily believe.

Importance of Proper Heating in Sheet-Steel Rolling

In the manufacture of heavier steel products the temperatures to which they are heated are high, comparatively, and there is some latitude; but with sheet steel the heat must be just right. Even starting with the bar, say, as it comes from the furnace for the first pass in the mill, if it is too cold the scale will not be lifted and this scale rolls into the sheets, making rough surfaces and causing them to stick together when later they are rolled in packs. If the sheet mill could receive only bars that were perfectly clean, no harm might be done even if they were a little too cold; but all commercial bars carry scale and this, of course, must be taken into account.

However, if instead of the bar coming too cold from the pair furnace, it is a little too hot, then there is still

worse trouble; for the large sheet rolls will get hotter than the roller anticipated, will expand and the line of contact between them will not be correct. In addition, as the bar is too hot it will be softer than it should be, and will not spring the rolls the desired amount. The consequence of this is that the bar, when worked down on the chill rolls, will produce a sheet round on the back end, that is, thinner in the center than at the sides; whereas, probably, the bar that preceded it had the proper temperature and produced a sheet that was not long in the center, but long on each side, having what the roller calls "horns."

A round-end sheet indicates that the rolls are "full" in the middle, and horns show that the rolls are "hollow." Now when a circular-end sheet is placed on top of a horned sheet and the two are reheated and put into the rolls together, the pack will either pinch or run off at the back end; that is, the sheets will spread one from another on the back end of the pack, due to the uneven drawing. Even if the roller, by great care and judgment in adjusting the draft screw, is able to prevent a pinch, the scale which is produced by excessive heating will lift only in spots, sinking into the sheets and causing the pack to stick together in patches, so that the sheets cannot be pried apart without tearing.

Every one familiar with sheet rolling realizes that the rolls must be kept at the proper heat, so that they will maintain the proper shape to roll successfully such a thin product. A roller may (probably unconsciously) count on a certain spring to a stand of rolls, and by trial find the proper heat to go with it, so as to keep the shape of his rolls right; and he will watch carefully the size of the horns on each sheet, as this is an indication of the shape of the mill. He knows that if he rolls too fast—does not allow time enough between passes—his rolls will lose their shape. Neither must he roll too slowly.

Again, sheets always entered at the same place on the roll may cause trouble. He must constantly watch and guard against such things as cold drafts of air blowing on the rolls, or anything that will in any way affect the temperature of the roll. Of late years some of these difficulties have been helped by burning gas against the rolls to expand them when not in operation, or by blowing steam on working rolls to keep down the expansion.

Roll-Neck Friction an Important Factor

Another most important factor is the roll-neck friction; it is not always appreciated how much this is. For example, when finishing a pack, if one neck of a roll be greased (with hot neck grease) without greasing the other, the pack will always draw a long horn next to the neck that is dry. The reason is that the friction on the ungreased neck is greater, and consequently heats and expands the roll on that side. It is believed that from 60 to 90 per cent of the power required is used in overcoming roll-neck friction, although there are no definite figures to go on. This is one of the most important things in roll design, and yet there is no scientific information available on the subject; if there were it might lead to some radical changes.

Prof. W. Trinks† has plans for building an experimental rolling mill which is arranged so that each factor entering into the problem of rolling can be controlled. It is hoped that such a mill will be installed, for there is great need of definite figures in connection with all steel rolling generally. The apparatus devised for the purpose of determining roll pressures and

*Professor of Commercial Engineering, Carnegie Institute of Technology, Pittsburgh; formerly chief engineer, American Sheet & Tin Plate Co.

Condensed from a paper presented at a joint meeting of the Pittsburgh Section of the American Society of Mechanical Engineers and the Engineers' Society of Western Pennsylvania, April 26, 1921.

†Carnegie Institute of Technology.

spreading forces in this mill was described at length in *THE IRON AGE*, Jan. 8, 1920, pages 121-124, by W. B. Skinkle, then Director of the Bureau of Rolling Mill Research, Carnegie Institute of Technology.

On hot-roll sheet mills at work, a blue or indigo color is often observable. This corresponds to a temperature of about 550 deg. Fahr. This temperature often runs higher, although when reaching 750 deg., showing a gray, the roll is liable to break shortly afterward. In a totally dark room 900 deg. Fahr. would probably give the roll a perceptible red color. Naturally the roll is hotter in the center than at the ends, and the necks are still cooler; for although grease is often seen burning on the neck, yet the temperature at which it burns is generally lower than the temperature of the roll, as indicated by its color.

In the history of sheet rolling there has been a tendency continually to increase the diameter of the rolls, until to-day sheet rolls of 30 in. are seen, and rolls as large as 32 in. have been reported. The larger the roll, the more tonnage can be turned out, as the large roll does not change its temperature as readily as a small one. There is evidently a limit to the size, however (aside from practical considerations of handling such heavy rolls), for the larger the roll, the more the radiating surface to cause cooling. The fact that the volume varies as the cube, and the surface only as the square, of the diameter,* has only an indirect relation to this problem of cooling. It is also to be borne in mind that the larger curvature will not draw the steel so much for the same total pressure.

So far as the breakage of rolls is concerned, this is apparently due to unequal expansion, and not to the stress of rolling—as evidenced by the fact that rolls sometimes break when the roll is standing still, the roll train perhaps having been stopped for a few moments during the working period.

The Possibility of a Continuous Sheet Mill

Considering now the possibility of a continuous sheet mill, it will be remembered that, about fourteen years ago, the United States Steel Corporation spent a large sum at South Sharon, Pa., to install a continuous sheet mill, which consisted of a series of stands of ordinary two-high rolls in tandem; the sheet passing through one stand after another, never being in two stands at the same time. The sheets were automatically doubled and matched together in special devices at certain points in the train. It was thought that, even if it were impossible to roll the lighter gages, such as 26 and 28, heavier sheets of 18 or 20 gage could be thus successfully rolled. After a most thorough trial, however, the mill was dismantled and the ordinary method of sheet rolling installed.

This is a convincing and definite proof of the great difficulties of sheet manufacture, by using our present roll stands in a continuous train. Aside from any other question, the difficulty of keeping so many different rolls in a like expanded condition and shape seems insurmountable. The present method of using gas and steam on rolls, which was not known at that time, might have aided a little; but something much more certain than this must be devised if light gages are to be rolled in this manner. Possibly the heavier gages, 10 and 12, say, could be made in this way; but we already have satisfactory mills of a different type for this purpose, and we would be no further along toward automatically rolling light-gage steel.

Some method of heating the steel absolutely to a definite temperature, possibly some form of electric furnace, and some way of keeping the shape of the roll, must be devised. Rolls have been cast with holes through the centers, and steam introduced or gas burned inside them; but they have been found inadequate to hold their shape and stand up to the service. The practice already mentioned, of using gas and steam on the surface of the rolls, is more satisfactory. Perhaps some day rolls will be placed inside a constant-temperature furnace; but what would be done about the bearings and other details is a question as yet unanswered.

*For rolls equal in length, the volume varies as the square of the diameter, and the area directly as the diameter.—
[EDITOR.]

Some twelve or more years ago the author visited an extremely interesting continuous sheet mill in Tepitz, in Northern Austria. There are five stands of two-high continuous rolls, all alike, having a diameter of 23½ in. and a length of 59 in. In front of this is a small set of three-high rolls, and to the right a larger set of three-high rolls.

An 8-in. slab is delivered to the large three-high mill and broken down to 3 or 4 in. thick. This slab is then cut in half and put into a reheating furnace. One of the halves then goes to the small three-high mill and is reduced to 9/32 in. (7 mm.) thick, and then without reheating is put into the continuous stands. This thickness (9/32 in.) is always the same, and the reduction is varied on the continuous mill to give the required final thickness. The sheet is finished about 60 ft. long, and is of course in all the stands at the same time.

Sheets are always rolled singly, never in packs or doubled, and are from 40 to 50 in. wide. The stands are about 9 ft. from center to center, and no idle rolls or automatic tables of any kind are used, simply stationary guides 6 or 8 in. high, and a cast-iron plate between the stands, on which the sheet slides. The gear train gives the first stand rolls 30 r.p.m., the next 37½, then 45, 52½, and 60 r.p.m. for the last stand. When the author saw the mill, it was rolling a final product of 12 gage, making a total reduction in the five stands of some 58 per cent (from 7 mm. to 3 mm.).

Several points of great interest present themselves in connection with this mill. The first is the fact that such a thin piece of steel could be in all the five stands of rolls at the same time, and neither tear nor be crumpled between them. There is a great deal of confusion as to the pull exerted by rolls generally on steel, but as a matter of fact there is little if any pulling action, assuming the steel to be free and not held by any outside force.

The resultant of the various forces acting on the steel must be vertical; for if it were inclined there would be an unbalanced horizontal component which would cause acceleration, making the bar go faster and faster. Therefore, if the speeds and drafts are correct among the various stands of rolls, the sheet will not "pull" itself to pieces going into the rolls, assuming that the shape of the rolls is also right.

This continuous mill has demonstrated the fact that not only can the shape of the rolls be controlled, but the speeds and drafts among the various stands can be properly adjusted, at least for single sheets as thin as 14 gage.

Another point of great interest is the fact that the back end of the sheet comes out thicker than the front end, due to the rapid loss of heat while in the continuous rolls. The finished sheets are respectively 2.5 mm. and 2 mm. thick at the edges at the back and front ends, and 60 ft. long. To operate this mill economically it must work these long lengths, and it is the practice to cut the 60-ft. sheets into short pieces, and afterward sort together the corresponding thicknesses from the different long lengths of finished sheets, so that the variation of thickness may not be noticeable to customers.

This mill was reported not a great financial success, as there was not demand enough to keep running steadily on these particular gages. Further, the engine running the continuous mill was of about 1000 hp. normal rating, and totally inadequate to run the mill satisfactorily.

Little experimenting had been done in trying to roll two sheets in a pack, for the furnace layout made it almost impossible to do so. But the little that had been done seemed to show, as one would expect, that the thinner the sheet the greater the non-uniformity of thickness. It would seem that a reversing two-high mill, receiving alternately the hot and cold ends of the steel, might equalize this thickness, and possibly be more satisfactory than the five continuous stands. So the question would naturally arise as to the best method to employ in rolling 12 and 14-gage sheets.

Then, too, it would be impossible to take this 12 or 14-gage material rolled on a special mill and finish it on the ordinary two-high sheet mill. Shapes of

sheets and rolls will not fit, and while one of two packs might be rolled with care, the scrap loss would be enormous; this has been tried commercially and failed.

It has also been suggested, and thought possible, to reduce the cost of sheet rolling by starting with the product from a universal plate mill, instead of a sheet bar mill. If a universal plate of 7 or 8 gage and of accurate width were cut to proper size, it would be equivalent to doing away with some of the present roughing-down process. However, when the price of universal plate is taken into account, there is little or no gain; and in addition the difficulty of doing good work has been greatly increased.

It would seem that sheets might be successfully rolled in packs on a two-high reversing mill. The condition of the same two rolls in the same relation to each other and the same pack of steel is what we have in the commercial mill now; and certainly with reversing

roller tables, etc., a large saving in labor would result, even if the tonnage per set of rolls was not increased. But it must be remembered that, in a reversing mill, first one end of the pack and then the other would be entered; and that this thin pack of sheets would have to be drawn first in one direction and then in the opposite direction; and that the two ends of a pack are not alike. So that we really have a very different condition from the ordinary two-high stand.

This sheet-machinery problem is a real one, but the only logical way of approach seems to be from the scientific experimental side. It has been pretty well demonstrated that practice cannot furnish enough information. We need more knowledge of what actually occurs in rolling, what are the pressures, heat distribution, radiation, friction, etc. When enough data and information are at hand, new ways and means, as always happens, will be indicated.

ACTIVE PIPE DEMAND

More Inquiry from Oil Producers—Basic Pig Iron Firmer at Youngstown

YOUNGSTOWN, OHIO, Nov. 29.—Iron and steel situation in the Mahoning Valley has been marked by a number of distinctive developments during the past week. Among these has been an appreciable improvement in volume of inquiry for line pipe from important oil-producing groups, as well as stabilization of the sheet market on the basis of 3c. for No. 28 gage black and 4c. for No. 28 gage galvanized. General conditions in the industry are more encouraging than a week ago.

Another significant factor is a decidedly firmer tendency in pig iron, standard basic becoming stronger at \$19. A Valley steelworks interest which has been in the market for 2000 tons of basic states that \$19 represents the lowest bid which it has received.

Among line pipe inquiries before the trade are three of particular consequence, involving respectively 312 miles, 250 miles and 150 miles. District pipe interests expect some of this business to be allotted before the week ends. Report that an order for line pipe involving 18,000 tons was placed in the Mahoning Valley last week meets with denial by each of the two producers and lacks confirmation in other quarters.

An Important Contract

One of the most important single contracts in several months has been placed with the Powell Pressed Steel Co., Hubbard, Ohio, by the Durant Motor Co., Inc., for stampings and pressed steel parts. Value of the contract is estimated at \$500,000, and it will engage the capacity of the pressed steel interest for nine to ten months. The company will do all the general stamping for the four-cylinder and six-cylinder cars to be manufactured by the Durant interests. The contract will supply a market for several thousand tons of strips, light plates and sheets. As rapidly as it secures dies and tools for the work, the Powell Pressed Steel Co. will expand its operating rate from 65 per cent, the current production, to 100 per cent, which it expects to reach in about four weeks.

A pressed steel interest at Warren has recently booked two large orders, one from the Ford Motor Co. for brake drums and pressed metal parts, and the other from a Chicago electrical stovemaker for 20,000 stoves. The stoves are shipped from Warren to Chicago, where the electrical appliances are installed.

Sheet and Tank Orders

The Warren City Boiler & Tank Works, Warren, has received an order for nine storage tanks from an oil interest, which will involve over 1000 tons of plates.

During the week sheet orders aggregating several thousand tons were placed with Valley independents, principally for round-lot tonnages and prompt shipment. While there has been some buying for delivery

during the first quarter of 1922, it has been moderate in volume. Last Saturday's mail brought miscellaneous orders for 400 tons of sheets of various sizes and grades to one Valley producer.

Establishment of sheet prices at 3c. and 4c. is in line with the movement inaugurated during the early fall by a number of independent mid-Western interests to stabilize prices. This movement met with limited success and during the past two weeks before the new quotations were definitely established, the market suffered from price unsettlements.

Activity in blue annealed sheets has been of a restricted nature, with little new tonnage coming out. The market is quotable from 2.25c. to 2.50c. Considerable tonnages of sheets for Japan have been shipped from the Valley the past month, billed via the Panama canal.

In connection with the betterment in line pipe inquiry, producers say that prices are steady and that regular discounts are being adhered to. The same applies to merchant grades of pipe, they say, in the face of a somewhat weakening demand.

Firmness of Pig Iron

A number of Valley steelworks interests with sizable accumulations of pig iron declare that \$19 represents the bottom of the market at this time. Two weeks ago a large interest admitted that tonnage of an attractive nature might be accepted on a lower basis. Policy of hand-to-mouth buying still largely prevails, though several sizable inquiries have been before the trade, one involving upward of 5000 tons for shipment to a steelworks plant.

Strip steel industry in the Mahoning Valley continues to benefit from the high productive rate maintained by the Ford Motor Co., and large tonnages of both hot and cold-rolled are going forward to Detroit. Other automobile interests are likewise strip buyers, besides taking good-sized tonnages of full-finished sheets. There is evidence of cautious buying, however, on the part of motor car builders.

The Chain Belt Co., Milwaukee, placed its gray iron foundry on a full time schedule during the past week and increased the working force 20 per cent, so that this department is now operating one shift of 9½ hr. a day, with as many hands as during the peak period since the new plant was built two years ago. The company reports orders for gray iron castings which will keep the foundry busy on full time well into 1922. Orders are coming from a widely diversified source and the November bookings were the largest of any month this year, upsetting the usual rule of a declining movement of orders in the last two months of the year. The malleable foundry department has also experienced a decided increase in orders and is now making two heats daily instead of one. In its special line of concrete mixers, paving outfits and construction equipment, the company looks for a fair business in 1922, with no spasmodic revival but a gradual, healthy growth.

Ore Transfer Car of New Design

A new design of side-dump ore transfer car having novel features has recently been built by The Atlas Car & Mfg. Co., Cleveland, for the Indiana Harbor works of the Inland Steel Co. The car is shown in the accompanying illustration. It has a capacity of 60 net tons and a hopper containing 960 cu. ft. of ore when level full. The discharge is from one side. The car has two independently controlled discharge gates which are operated by compressed air cylinders from the cab. The hopper is divided into two sections by a central partition so that either half may be dumped separately or both sections simultaneously.

A pusher arm is provided to push cars on parallel adjoining tracks. This arm is controlled by a compressed air cylinder and is operated by means of a

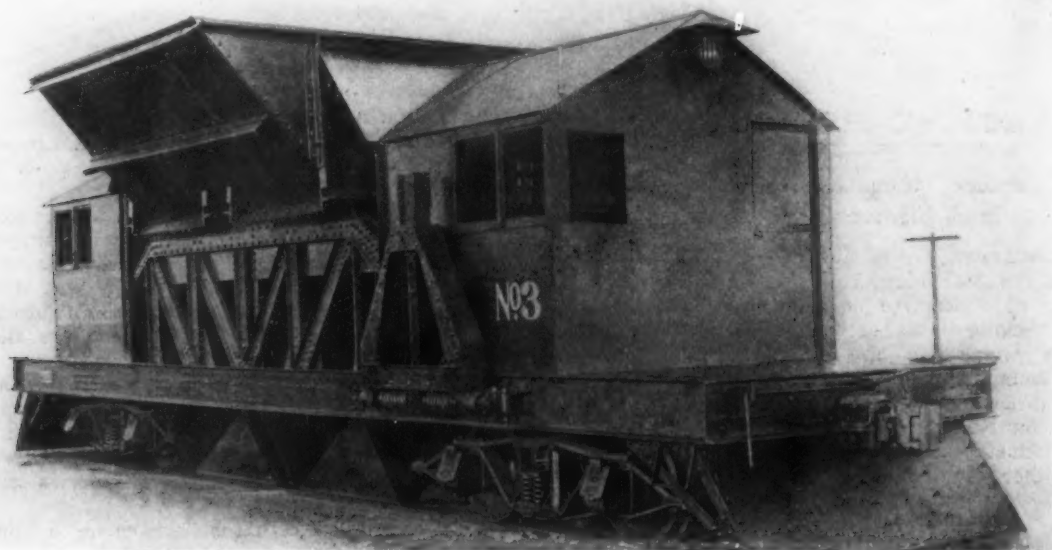
ration, carries the audience from Tampico, Mex., to the great oil fields of that country.

Application for the loan of these films should be made to the Bureau of Mines, 4800 Forbes Street, Pittsburgh.

Lower Coal and Coke Prices

UNIONTOWN, PA., Nov. 28.—The H. C. Frick Coke Co. continued to increase its active oven list last week, the company now having slightly in excess of 3000 ovens going in the Connellsville region. It is understood that a large part of the output of the ovens is being sent to tin plate plants of the Steel Corporation. Coal production of the company also has been slightly increased this week.

The week, however, brought a slump to independent



The Hopper Is Divided Into Two Sections, Either of Which Can Be Dumped Separately, or Both Simultaneously

valve in the cab. When the arm is in an upright position, it is locked in place to prevent accidents. The car is so arranged that the space between the sheathing and the car body proper can be heated by means of salamander fires in order to prevent the ore sticking in the hopper. The hopper itself is so shaped that the discharge opening forms the widest point of the car, all surfaces sloping toward the discharge opening so that there will be no tendency for ore to stick in the hopper even in the coldest weather.

The length over end sills is 41 ft., the width 18 ft. 4 in., and the height 13 ft. 3 in. over all. The distance from center to center of trucks is 26 ft. Each of the discharge openings is 2 ft. 6 in. x 5 ft. 9 in., and the hopper opening is 18 ft. x 12 ft. The coupler height is 2 ft. 10½ in. The car is driven by four 62-hp., 250-volt series-wound motors of the railway type, mounted directly on the axles with spring suspension to the tracks. A Cutler-Hammer magnetic switch is provided.

Bureau of Mines Educational Films

Two new motion picture films have recently been produced under the direction of the United States Bureau of Mines, in co-operation with industrial organizations, and are ready for distribution for educational purposes.

"The Story of Heavy Excavating Machinery," produced in co-operation with the Bucyrus Co., depicts the many types of steam, gasoline and electric shovels and other heavy excavating apparatus that are used in mining operations. The picture shows scenes in the iron mines of northern Michigan and the quarries of New England, and illustrates coal stripping operations in Ohio, and also drag-line and tower work in the conservation work along the Mississippi River.

The second film, "Mexico and Its Oil," produced in co-operation with the Sinclair Consolidated Oil Corpo-

operation in both coal and coke. This has been accompanied by a softening in the market with the result that coal is being sold at around \$1.15 and upward; furnace coke at \$3 and upward, and foundry coke at around \$3.75.

Prospects of a reduction in freight rates is given as one factor in the slump. Another reason assigned is that some fuel interests stocked a little above the average as a result of the menace of a railroad strike and that these surplus stocks are now being worked off.

Construction of highways to the total value of \$76,400,000, covering 6261 miles and employing more than 150,000 workers, is about to be undertaken by 30 states, as the direct result of the recent passage of the Federal Highway act, it is stated at Washington by the Department of Commerce. This is the act which was recommended by the President's conference on unemployment as an emergency measure to provide jobs for the nation's unemployed. The figures as to the amount of work which could be undertaken by the states in the construction of highways were supplied by the governors in response to letters sent them by Secretary Hoover. The letters asked what amount of work they could get under way within a period of 90 days after the passage of the act. According to the act, which created a fund of \$75,000,000 to be apportioned among states taking advantage of the 90-day period, each state will be entitled to receive, on the basis of the value of its work, its specified federal allotment. Part of this allotment is available now and part will be available Jan. 1.

The Steel & Tube Co. of America, Chicago, has completed overhauling and improving its blast furnaces and coke plant at Mayville, Wis., formerly known as the Northwestern Iron Co., and expects to resume operations with a normal working force on Dec. 1.

Die Castings and Their Use in Industry

Their Relation to the Consumers of Sand or Malleable Castings—Dies and Their Construction—Designing the Castings

— BY C. T. RODER* —

LITTLE has been written on the principle of making die castings and the practicability of applying this to manufacturing establishments where the use of sand castings and malleables predominates. In the following the writer endeavors to give a brief history and general synopsis of the advantages of die castings, with a view to aiding concerns now manufacturing or using the product, or to those who might be prospective users.

History of Die Casting

The die casting process was used to make type 70 years ago, but it was not until 1892 that the Franklin Die Casting Corporation of Syracuse, N. Y., started production on a large scale. During the first decade of this industry, die castings were chiefly used by manufacturers of phonographs, telephones and cash registers. In 1906 the Doehler process came into the commercial world, and since then several other companies have been organized, most of which have failed. The progress of the industry is comparable with automotive development, its commercial and technical progress being connected with the manufacture of automobiles.

A die casting is produced by forcing liquid metal into dies under pneumatic pressure. It is only recently that aluminum base alloys have been developed and, until 1914, the only metals successfully die-cast were those which fused below 1300 deg. Fahr. Previous to 1914, 90 per cent. of die castings were made of a composition of zinc alloys. Since aluminum alloys have been found to be practical and efficient, fully one-third of the die castings in use are of this composition. It is claimed that the annual production of such castings now reaches approximately 3,000,000 lb.

Advantages to the User

The advantages of die castings lie in the small amount of machining necessary, reduction of assembling, accuracy, finish and appearance, range of design, cost and possibilities of quick delivery. Most of these advantages are not appreciated until castings are used for a stipulated period and comparative data becomes available. For this particular reason it is difficult to convince a prospective user that the substitution of die castings for some of his present methods of manufacture is more efficient and in the long run will cost less.

The use of die castings can eliminate practically all machining. It is sometimes necessary and advisable to do some machining but in this case the casting is usually made simpler and the cost decreased. As an illustration inside threads, inside grooves, etc., are usually inadvisable to cast, therefore, machining becomes necessary. When necessary to machine, the cost is usually less than the same cost would be on sand castings owing to the accuracy and uniformity of die castings and the ease in which they can be handled in jigs and fixtures.

In the case of assembling, it often happens that several parts, which ordinarily must be made up separately and assembled otherwise, can be combined and cast into one die castings. In such a case one can easily see the

advantages of greater accuracy, lower costs, much more rigidity and strength and far better appearance. Also, the combining into one part or casting eliminates the possibility for separate parts to become out of alignment. On account of the accuracy of die casts, this in itself makes assembling an easy problem.

It must be conceded that the accuracy of die castings are far beyond other methods of casting. Naturally, if a die is not made correctly castings will vary. Inasmuch as the metal is forced into the die under pneumatic pressure there is little or no possibility of the casting varying. However, designs and dimensions, also mixture of metals, have a material effect. Large castings are more difficult to cast than smaller ones and of course the possibilities of inaccuracy would be greater.

The shrinkage is taken care of in the die as shrinkage usually occurs after the casting is taken from the die. It has been found in various die casting shops that the shrinkage of mixtures are approximately as follows:

Lead and tin.....	Approximately 0.002 in. per inch
Zinc	Approximately 0.004 in. per inch
Aluminum	Approximately 0.007 in. per inch

On account of the great accuracy to which dies are constructed, a casting will have almost a perfect finish so that it is unusually smooth and free from porous conditions and other impurities so prevalent in sand and malleable castings. The finish depends upon correct mixtures and the manner in which the work is handled. Undoubtedly the latest designs in die castings machinery have perfected the above condition, even to a greater degree than is generally known to manufacturers now.

Greater and wider ranges of design are brought about by the die casting process. Many parts, if carefully analyzed and studied, can so be designed as to be applicable to die castings. It is sometimes said that range and design are almost without limit. One authority writes that die casting manufacturers have been forced to do "impossible" things during the past 10 years.

As to costs, this is more or less a difficult subject, as the initial cost of die casting is usually greater than sand castings. Costs on stock castings cannot be kept, as each individual part requires either a difference in design, weight or quantity. The principal item is the cost of dies, which is usually great on account of the quality of steel necessitated, the great amount of time necessary to build it and the skill of the tool or die maker. However, one must not overlook the fact that a die is a substitution for patterns, jigs and fixtures. If castings are used in quantities of 10,000, 25,000, 50,000 and 100,000 lots, and comparative data are kept on costs, the result will be less than sand castings. Labor costs are held to a minimum because, after the cost of the die, the completion of a casting can be achieved by the most ordinary unskilled workman.

Quick delivery can be effected almost immediately after a die is completed. This of course depends upon the machining necessary and to what extent gates, sprues and flash form a part of the casting. On repeat orders work can commence immediately, as the die is

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usually held in the plant of the manufacturer who is responsible for its care and upkeep. Production also depends on how modern the manufacturer's equipment may be and how experienced he is in the die casting manufacture. On large orders and if the casting is not too complicated a production of 200 to 300 pieces per hour can be obtained.

Dies and Their Construction

In the writer's experience with dies, no greater problems have presented themselves as in the construction of successful die casting dies. When the heat at which the dies are operated, and the heating and cooling which take place are considered, it is easily understood that dies are subjected to extreme wear. The design, workmanship, quality and composition of steel used will be the important factors in the life of a die. Some dies can be used for 15,000 or 20,000 castings and others up in the hundreds of thousands. Only the most skilled tool and die makers can be employed on this work as it is clearly pointed out in the foregoing that 80 per cent of the accuracy and finish of a casting depends upon the die. Usually any inaccuracy in a casting can be traced to faulty design of the die.

In dies for parts made of white metal alloys a high grade of machine steel is used. In dies for aluminum parts an 0.40 to 0.50 per cent carbon steel is used. It is not the general practice to heat treat the steel that is used in die casting dies, as the distending and contraction causes cracking. On ordinary parts the dies are made of two blocks but, in cases of more intricate design, the dies are composed of several parts. The ejector box is made of cast iron. In this box is also the core and ejector pin both of which are operated by rack and pinion construction. A constant flow of water is continually flowing through the die when in operation to regulate the temperature and to keep it from becoming too hot. It has been only recently that power driven die casting machines have been designed as, heretofore, in order to hold the die absolutely compact, clamps and toggles were used.

Classifications and Weights

Generally speaking, the manufacture of die castings can be divided into the following divisions:

Aluminum base alloys	Lead base alloys
Tin base alloys	Zinc base alloys

Of the above, aluminum and zinc base alloys constitute the larger percentage of the total production of the die casting industry. An aluminum casting is probably more popular than zinc on account of the crystal-line structure which is prevalent in zinc. Owing to the absence of this condition in aluminum castings they are more reliable. They are also superior in strength, have greater flexibility, are lighter and of lower specific gravity.

An approximate practical limit in weight of die castings is as follows:

Zinc and tin alloys.....	10 lb.
Lead alloys	15 lb.
Aluminum alloys	3 lb.

The size of die castings seldom exceed 24 in.

Designing Die Castings

One of the leading authorities in the manufacture of die castings claims that the following information, if borne in mind when designing, will make possible their successful use:

In dealing with steel cores, as is necessary in a process producing finished parts, undercuts or recesses in the casting should be avoided. In many cases it is, if course, possible to use collapsible cores, but this increases the cost of both dies and castings.

To give added strength, pins, rings and bushings made from brass, bronze or steel may be inserted in casting.

No allowance for shrinkage or machining should be included in making drawings except where the limits are such that a special operation is desired, when it should be clearly noted.

Parts which require little or no machining after being sand cast or which can be economically produced by stamping or screw machine methods are not usually adaptable to die casting.

It is cheaper to cast raised than depressed letters or figures, but both are practical.

Small fillets added at sharp corners greatly strengthen the casting and increase the rate of production.

The cost of die work may sometimes be reduced by knowing the important dimensions both where accuracy is required and where it is not essential.

The following limits should be borne in mind in designing die castings:

Limits or minimum wall thickness:	
Lead	$\frac{1}{32}$ in.
Tin	$\frac{1}{32}$ in.
Zinc	$\frac{1}{16}$ in. (on small castings $\frac{1}{8}$ in.)
Aluminum	$\frac{1}{8}$ in. (on small castings $\frac{1}{16}$ in.)

Possible variations from drawing dimensions, per inch of diameter or length:

Lead	Plus or minus 0.001
Tin	Plus or minus 0.0005
Zinc	Plus or minus 0.001
Aluminum	Plus or minus 0.0025

Where the distance is several inches these limits may sometimes be reduced.

Maximum number of threads:	
Lead, external	24 per inch
Zinc, external	30 per inch
Tin, external	34 per inch
Aluminum, external	20 per inch

In the case of aluminum, where close fit is required, thread should be cast oversize and chased. Where economical, internal threads may be cast in parts made from zinc, tin or lead base alloys, but this is not possible in parts made of aluminum.

Holes:	
Lead	$\frac{1}{32}$ in. minimum
Tin	$\frac{1}{32}$ in. minimum
Zinc	$\frac{1}{32}$ in. minimum

Regulated by depth of hole and thickness of casting.

Aluminum

Size of hole is dependent on its length and general design of casting. Holes not cast can usually be spotted to facilitate drilling.

Draft:	
Lead and tin, cores 0.0005 per in. of length and diameter; side walls, 0.001 per in.	
Zinc, cores 0.001 per in. of length and diameter; side walls, 0.001 per in.	
Aluminum, cores 0.015 per in. of diameter and length. Cores less than $\frac{1}{4}$ -in. diameter to have 0.005 per in. of length and diameter; side walls, 0.005 per in.	

While the above draft is desirable, it is sometimes possible to modify these limits where they would interfere with the service required.

Thus, it will be seen from the foregoing that the die casting process is a varied one and one which presents unlimited difficulties. Each new die casting is really a job in itself, this being especially true in parts of intricate design. Hardly a day passes but what some experiment has been developed, either in die making, alloys or some other point of connection. Metallurgists and chemical laboratories are constantly experimenting and analyzing in their endeavor to perfect alloys for various parts being produced. Die designs are being made stronger and better. The understanding of what steel should be used in die construction is being improved daily and the life of dies are thereby enhanced. The understanding of finishes employed in die cases are reaching a point of perfection and nearly all alloys are successfully nickel, silver and gold plated, lacquered, coated with Bakelite; japanned or black oxidized.

Regarding the broadening of the field in which die castings may be used, it is safe to say that the manufacturer can solicit an order in practically every metal manufacturing institution in existence. The future of the industry lies in the proper development of a grade of steel which will permit the use of a die to stand up more efficiently under the wear and pressure to which they are constantly subjected.

It has been learned from experience that the follow-

ing classes of manufacturers are using and can use die castings in some or all of their product:

Adding and tabulating machines	Office appliances
Cash registers	Farm tools and machinery
Cameras	Cooking utensils
Clocks	Typewriters
Check protectors	Vacuum cleaners
Motorcycles	Fire extinguishers
Phonographs	Hardware
Fare boxes and registers	Pianos and players
Motion picture machines	Printing presses
Magnetos	Soda fountains
Safety razors	Weighing scales
Telephones and apparatus	Electrical equipment
Vending machines	Gasoline engines
Automobiles	Numbering machines
Washing machines	Plumbing fixtures

COMPANIES WIN

Preliminary Victory of Iron and Steel Manufacturers in Cost Reporting Case

WASHINGTON, Nov. 29.—Justice Bailey in the Supreme Court of the District of Columbia to-day denied the motion of the Federal Trade Commission to compel 22 iron, steel and coke makers to produce so-called sample sheets for inspection prior to the beginning of the hearing set for Dec. 8 in the monthly cost reporting case. The hearing, which is to be held before Justice Bailey, will revolve around the injunction restraining the commission from inspecting the books of the manufacturers concerned in case of the Claire Furnace Co., et al.

Decision Considered Victory for Producers

The decision of the court denying the motion is looked upon as an important victory for the producers, but has not changed the plan of the commission to proceed with the hearing. In denying the motion Justice Bailey took the position that to grant it would give to the commission the same material as that it is seeking to gather for the monthly reports and against which is an injunction, which the commission will seek to have dissolved, while the iron, steel and coke makers will attempt to have it made permanent.

In the arguments last Friday on the motion Attorney Levi Cook, appearing for the producers, said that such permission in advance would "be an unconscionable act of inequity." He declared that the commission wants to put its expert accountants at work on the books so as to "go on a fishing expedition and see what they can dig up." It was his contention that the commission would take advantage of the advance inspection in order to get material really desired through monthly cost account reports wanted by the commission from the manufacturers. It was maintained that the commission is now asking for more data than originally were asked, including every record and memorandum available, even involving data of the foremen. Mr. Cook declared that it would be a violation of the fifth article of the United States constitution preserving property rights to compel his clients to furnish reports. While the cost to do the work would be great, it was pointed out that regardless of this item the request is wrong in principle. Moreover, it was stated that it would be a physical impossibility to assemble at any one given point in any short space of time the books of the companies; that the production costs are not kept in the form asked by the commission and that its request is unreasonable.

Charged That Producers Hampered Government

Attorney William T. Chantland, who, with Attorney Jesse C. Adkins, appeared for the commission, charged that the producers were seeking to stop a Government agency from functioning. This case, it was claimed, is broader than the Maynard Coal Co. case was. In the latter Justice Bailey granted a permanent injunction against the commission, forbidding it to get cost of production figures from the respondent.

Three basic defenses are being made by the iron,

steel and coke producers, said Attorney Chantland, who outlined them as follows: They charge the commission's request as unreasonable and an abuse of discretion; that it would involve work so burdensome as to deprive them of their rights under the fifth article of the constitution; and that it would interfere with private corporations, most of which do both an intrastate and interstate business, but, it was stated, they do not keep books separately on the two classes of business, the commission having jurisdiction only over interstate business. Mr. Chantland made arguments in which he sought to show the defense set up was not well taken. He declared, in arguing for advance inspection of so-called inspection sheets, that it will be necessary to require an examination of the books and that the Federal Trade Commission will want its own witnesses and to cross-examine those of the producers. It was contended by Mr. Chantland that he would be derelict if he did not ask for books in advance. Justice Bailey raised the question as to whether the manufacturers would bring in their books in advance. Mr. Chantland expressed the hope that they would, adding that in any event the case would be appealed to the United States Supreme Court. Mr. Adkins made arguments largely similar to those of Mr. Chantland.

The right to obtain cost production figures is claimed by the commission under Sec. 6 of the act creating it. When it attempted to assert that right last year, the 22 companies involved in the present cost enjoined the commission after the commission had instituted mandamus action against the Republic Iron & Steel Co., and the Bethlehem Steel Co.

Freight Rates on Scrap

A conference was held in Pittsburgh recently between steel company traffic officials and railroad officials, for the purpose of securing a reclassification of scrap iron freight rates. For years past, scrap iron tariffs have been based on the billet rate, and the steel company representatives claimed at the conference that it was unfair to charge as high a rate on what is properly a raw material as is charged on semi-finished material, particularly as scrap iron has much less value than the semi-finished steel. It was argued that scrap, save on those grades which are not remelted, should not carry a higher rate than pig iron, and a demand was made that the scrap rates be brought down to the same bases as pig iron. The railroad officials took the plea under advisement.

Jones & Laughlin Steel Co. Acquires Coal Lands

The Jones & Laughlin Steel Co., Pittsburgh, has just concluded negotiations for the acquisition of 14,000 acres of coal land in Greene County, Pa., along the Monongahela River, the seller being the Piedmont Coal Co., which took over the greater part of the holdings of Josiah V. Thompson, the Uniontown, Pa., operator. This coal is deep vein, and in addition to the advantage of river transportation afforded by the location of the property, it is in the non-union district, and the company thus will have more control over mining costs than is possible in the union fields. The company has extensive coal properties at California, Pa., known as the Vesta Coal Co., and operates a fleet of barges and tow boats between the mines and the coke plants at Hazelwood and Aliquippa works.

It is announced that the Main Committee of the American Foundrymen's Association will meet at 10 a. m. Friday, Dec. 9, in the Engineering Societies Building, New York. This is the last day of the fall meeting of the A. S. M. E. This committee is studying the problems encountered by foundrymen in their use of molding sand and furnace refractories.

The Alabama Power Co. will have the 90,000 hp. Government steam plant at Sheffield, Ala., in use by Dec. 1. Georgia and the Carolinas will get at least half of the power. The contract is for a year and may be terminated by Secretary Weeks at 30 days' notice.

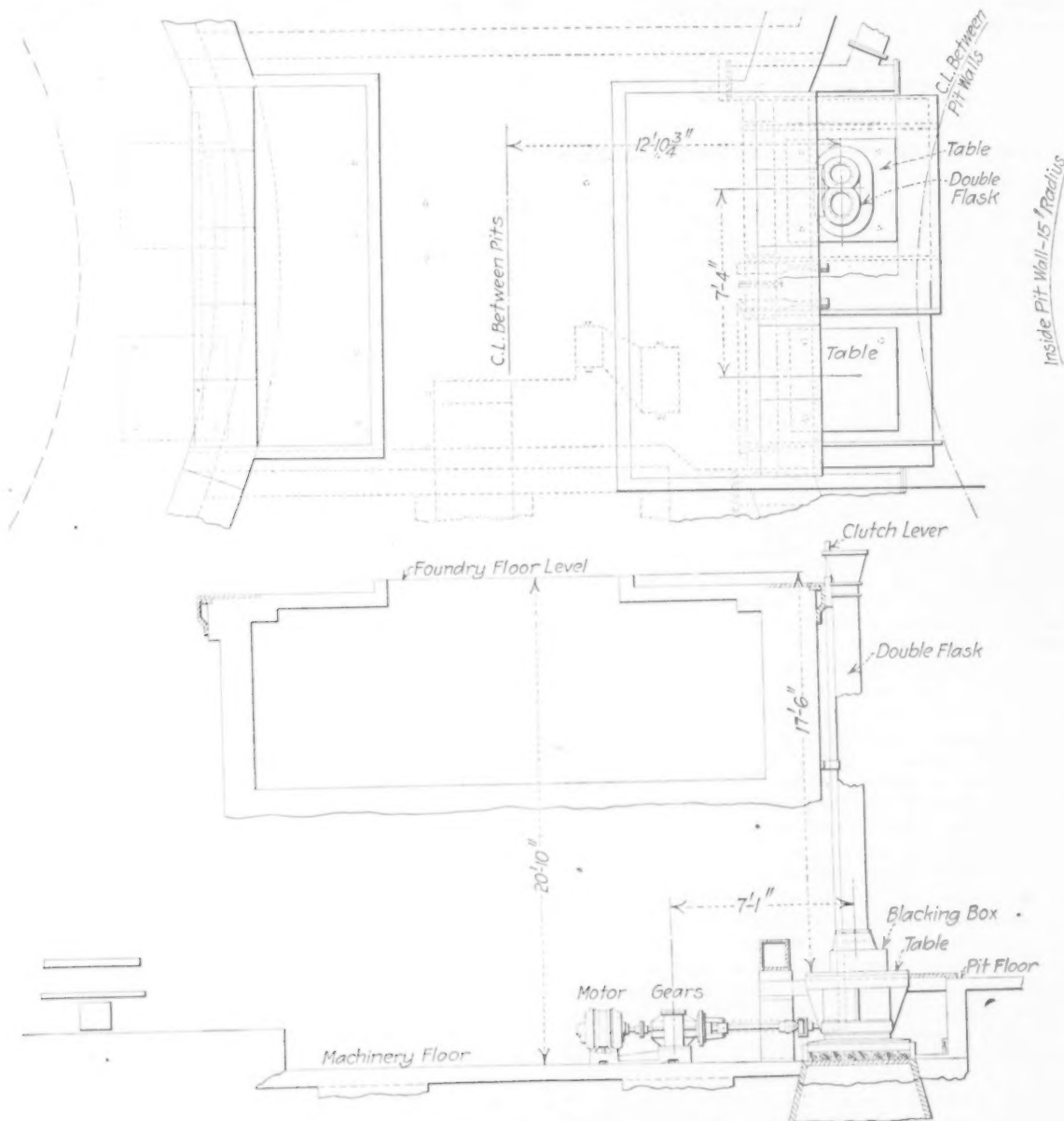
JARRING FOR MOLDING PIPE

Machines in Basement Handle Vertical Molds Arranged Within Reach of Jib Cranes

An application of the electric jarring machine, indicative of the wide field for its use, is to be found in the cast-iron pipe foundries in the South. The first pipe manufacturer to adopt the jolting machine for its molding work was the American Cast Iron Pipe Co. This company now has eleven in operation, while the National Cast Iron Pipe Co. has two and the United States Cast Iron Pipe & Foundry Co. is now installing two. All of the machines are motor-driven and were furnished by Henry E. Pridmore, Inc., Chicago.

tached to the sides of the pit serve to steady the flask, which is in a vertical position. After jolting has been completed, the top of the mold is hand-rammed and the pattern is drawn. In the National and American shops, where molding is done with the bells up, the slip socket forming the bell of the mold serves as a stripping plate; in the case of the United States plant, which molds with the bells down, the bead ring will serve the same purpose. After drawing the pattern, the blacking is applied to the inside of the mold, and the surplus, which in former practice was lost, is saved by withdrawing a slide in the pan underneath the mold, thereby permitting it to run into the blacking box below.

The jar-ramming machines have a capacity of 25



Plan and Section of Arrangement of Jarring Machines as Located in Two Pits, Each Served by a Jib Crane

Of standard Pridmore design, the jarring machine differs little from other installations except in size. The table is 48 x 48 in. and the lift is 1 1/4 in. Operation is by 30-hp. motor, power being applied through Jones reduction gears of the spur type. The machine is started and stopped through a rheostat instead of by friction clutch, as is the practice on most of the smaller types in use. The raising of the table is accomplished by a cam which works in contact with a roller follower forming one end of a bell crank.

The machine is situated in a basement under the foundry floor, the distance from the top of the table to the floor level being 17 1/2 ft. The table is centered at the bottom of the pipe pit and on it are superimposed a blacking box and the pipe flask. Two guides at-

tons and have been used in making 6-in. and 8-in. pipe. It is planned, however, to use them for molding larger sizes, running as high as 16 in. in diameter. All molds are made in pairs, the flask being arranged to hold two molds and patterns.

The molding pit is served by two motor-driven jib cranes. One of these sets the empty flask on the jarring machine, draws the pattern, removes the mold from the machine and sets it on the drying oven. The other crane removes the mold from the oven, sets the core, pours the pipe and shakes it out.

Most of the operations—molding, drying, setting the core and pouring—are carried on in the pit. The method used in removing the flask from the pit and shaking out the mold is of interest. The flask is made

in two halves, hinged together on one side, with flanges on the other side which are clamped together. Before the flask is lifted out of the pit all of the clamps, except the one nearest the bottom, are knocked off. Separate crane hooks are then inserted into loops projecting from both halves of the flask on the flange side, midway between the top and the bottom. The flask is then raised until it is more than half way out

of the pit, when, by knocking it against the edge of the pit, it is swung into horizontal position with the flanges on the bottom. After the flask has been conveyed to a position over a bed of rails, a workman knocks off the remaining clamp and the two halves of the flask pull apart, permitting the pipe to drop out. The flask is then immediately reclamped, and again superimposed on the jarring machine.

VARIED OPINIONS ON TAXES

Tax Revision Bill Attacked and Defended— Commission is Proposed

WASHINGTON, Nov. 29.—The tax revision bill enacted at the special session of Congress has proven to be such a disappointment to some prominent Republican Senators that there has already set in a movement for further revision of the internal revenue laws next year. Senator Calder, Republican, of New York, has introduced a bill to create a tax commission which would be empowered to study the entire question of internal taxation and report to the Congress at the earliest possible moment. Senator Smoot, who, like Senator Calder, is a leading Republican member of the Committee on Finance, expects that public sentiment will turn in favor of a sales tax.* Senator Townsend, also a Republican, wants the excise taxes removed because they hamper the recovery of business, and Senator Walsh, Democrat, of Massachusetts, is desirous that the individual taxpayer, particularly the man with a small income, be considered first in revising rates. There are many others who have voiced criticism of the law as finally enacted and signed by President Harding.

Taxation Cannot Be "Popularized"

But those supporting the measure point out that the various criticisms prove it is not possible to adopt a measure that would be universally popular and that it is out of the question to ever "popularize" taxation. They maintain that the act, while open to some criticism, has some good points, one of which is the elimination of nuisance taxes and the simplification of its administrative features. Retention of the Senate maximum income surtax rate of 50 per cent, which the President had opposed, has been a source of regret. It had been hoped that a compromise at least would be reached in the absence of adoption of the House rate of 32 per cent. The present rate is 65 per cent, so that the reduction as finally made is 15 per cent, and is no greater because of the opposition of the powerful agricultural bloc. The latter was not moved by vigorous statements that the large surtax diverts capital from the ordinary activities to investment in tax-free securities, diminishes receipts from income taxes and makes normal financing more difficult. President Harding, in response to a request from Chairman Fordney of the House Committee on Ways and Means, said he favored the 32 per cent rate because "I still believe the rate approved by the House to be nearer to a just levy and the more promising one in returns to the public Treasury." For the sake of harmony, however, the President suggested a compromise upon a maximum of 40 per cent.

Twelve and a Half Per Cent Accepted

The Senate finally accepted the House rate of 12½ per cent on corporation income as a substitute for the present excess profits tax and normal tax of 10 per cent, estimated to relieve business of taxes aggregating \$110,000,000 yearly. The measure also retains the existing normal taxes on individual incomes. The House accepted the Senate proposal to withdraw the specific exemption of \$2,000 in the case of corporations having net incomes in excess of \$25,000. Complete deduction was allowed for capital losses in the capital-gain provisions. The Senate accepted the House proposal which excludes corporations from the benefits of a reduced rate on capital gains.

The act repeals the war profits and excess profits taxes, transportation and insurance taxes, taxes on

soft drinks, etc. Taxpayers will not get the benefit, however, of repeal of the excess profits tax and the changes in corporation income tax and individual surtax until they pay their taxes in the early part of 1923 on income of the calendar year 1922. But the individual taxpayers will be allowed the exemptions applying to dependents and heads of families with moderate incomes on taxes paid in 1922 on 1921 income.

It is estimated that the act will raise \$3,216,100,000 in the fiscal year beginning July 1, 1922, and \$2,611,100,000 in the fiscal year beginning July 1, 1923, and, according to Chairman Penrose of the Committee on Finance, will relieve the country of more than \$700,000,000 in taxes.

These estimates naturally cannot be based accurately because revenue depends upon the volume of business transacted, and with the present condition of business, only a guess can be made as to the returns that may be expected. Necessarily, if business improves, the revenue will increase accordingly, while if resumption of activities is slow, the revenue will be held down. These reasons are cited to show that the present act must be considered as an emergency measure, aimed to apply as nearly as possible to prevailing conditions and give strength to the claims of members of Congress that tax revision again will be taken up soon.

Meeting on Pulverized Coal

The meeting which the Metropolitan section of the American Society of Mechanical Engineers is to hold on pulverized fuel at Bayonne, N. J., on Dec. 16, includes addresses by the following: James A. Kinney, chief engineer Lebanon Plant, Bethlehem Steel Co.; R. F. Walker, consulting engineer M. A. Hanna Co., Cleveland; William J. Fantneyer, superintendent Puget Sound Power & Light Co., Seattle; W. H. Maddocks, Parsons, Kan.; H. L. Kohlberg, of A. T. McGregor, Warren, Ariz.; H. R. Barnhurst, advisory engineer Fuller Engineering Co., Allentown, Pa.; H. D. Savage, Combustion Engineering Co., New York.

In the afternoon of that date there is to be an inspection of the plant of the Babcock & Wilcox Co., at Bayonne, followed by a supper and the technical session in the evening.

New French Aluminum Alloy

An alloy for mathematical instruments, known as aludur, recently placed upon the French market, is a hard, resistant, but light alloy containing 98 to 99 per cent of aluminum, which can be worked cold, stamped, pressed, or bent, says the *London Ironmonger*. Its specific gravity is 2.75. Three types are made, each varying slightly according to the uses to which the metal is to be put. It may be used for motor-car body work, articles used in the chemical industry, the dyeing industry, dairies and breweries, and in the manufacture of mathematical and optical instruments.

At McDonald in Trumbull County, Ohio, the model settlement created by the Carnegie Steel Co. for employees of its bar mills, and their families, the company is now completing a community house which will cost upward of \$100,000. It is a three-story brick structure, approximately 50 x 150 ft. on the ground dimensions. The first floor will be devoted to commercial uses, the second will be fitted with offices, pool tables and bowling equipment, while the third will be used as a hall. Its use is given to the people of the community without charge.

BELTS AS INSPECTION TABLES

National Acme Co. Inspectors Pick Defective Parts from Moving Conveyors

BY F. L. PRENTISS

A labor-saving method of inspecting screw machine products has been adopted by the National Acme Co., Cleveland, which is now using belt conveyors as inspection tables, the defective parts being picked out by inspectors while the product is moving along on the belt. These conveyors take the place of small individual inspection tables which have been generally used.

The first belt conveyor for inspection purposes was

pose and consequently no quick speed changes are required, although different speeds may be provided by changing the gears.

The work is first dumped on a slanting table at the feed end of the conveyor and an operator shoves it from the table to the belt. Several inspectors sit on stools on each side of the table and each picks out imperfect parts as the work passes him. By the time the parts reach the discharge end of the conveyor all defective ones have been removed. These are thrown into small pans, very similar to bread pans, that are placed on the conveyor short distances apart, so that one of the pans is always within easy reach of an inspector. The good parts drop from the end of the conveyor into shop boxes in which they are trucked away and the pans of defective pieces are



Defective screw machine parts are placed in the small pans that are carried along on the belt conveyor at the National Acme Co. By the use of these conveyors a given amount of inspection work can be done with less than one-half the amount of labor required under the old plan of doing inspection on stationary individual tables.

lifted from the belt. A stop is provided at the discharge end for holding back the parts on the belt while the receiving receptacle is being replaced, either when it is full or when another kind of part is coming through on the conveyor.

The use of these conveyors has resulted in a saving of over 50 per cent in the labor of inspection, 12 inspectors along the belt doing more than 24 inspectors at the individual inspection tables. There is also a considerable saving of labor in handling the parts. With the inspection tables the work had to be carried to each table and the parts carried away from each table after sorting. With the conveyor, all parts are delivered at one point at the feed end and are carried away from one point at the discharge end. Another important advantage of the use of the conveyors is the saving of floor space, as the conveyor takes considerably less space than the number of inspection tables required. Work is also inspected more thoroughly on the conveyors than on the tables.

installed in the inspection department of the company's Coit Road plant about a year ago. This conveyor, built by the Barber-Greene Co., was designed for handling coal and its new use was decided upon as an experiment. The conveyor was set up in the inspection room with its belt running on a horizontal plane, about 3 ft. above the floor, and several changes were made in the form of additions of stops and guards to make it applicable for its new use. The conveyor proved so valuable from an economical standpoint for inspection work that the company has since installed two similar conveyors for use in inspecting small parts, and a fourth conveyor is ready to set up.

Two of the conveyors are 50 ft. long and two are 30 ft. long. The conveyor belts are 18 in. wide. The longer conveyors are operated at a speed of 22 ft. per min. and the shorter at 30 ft. per min. These speeds are found generally satisfactory for the pur-

In a report on the South African iron and steel industry in 1920 the Union Government's mining engineer states that during the year the works of the Union Steel Corporation of South Africa, Ltd., produced 9903 tons of open-hearth steel and 2342 tons of electric steel from the Héroult furnace. A new 25-ton Siemens open-hearth furnace is in course of construction.

Lowering of Freight Rates Will Be Urged

Iron and Steel Interests Will Continue Their Efforts—Lake Superior Iron Ore Association Active—Recent Refusal of Railroads Disappointing

BY L. W. MOFFETT

WASHINGTON, Nov. 29.—Refusal of the railroads to grant the request of lake front iron and steel interests for reductions in freight rates on coal, coke, limestone and dolomite came as a distinct disappointment. While it was not wholly a surprise, in view of the peculiar attitude of railroads, which is said to be shared by some Government officials, that reductions are not justified because steel prices are not sufficiently liquidated, it was strongly hoped that the cuts would be made. The trade is firmly of the opinion that readjustment to normal conditions is entirely out of the question until transportation costs have been sharply decreased. Leaders of the iron and steel industry maintain that such action is necessary in behalf both of the industry and the railroads themselves, and would benefit the complete commercial and financial structure. They point out that proof exists in abundance to show that the steel trade has deflated prices, is producing at a loss and must have relief through lower freight rates. They also are strongly combating another prevalent belief of some officials that reduction in coal rates would not be passed on to the ultimate consumer, especially the householder. The plea is made that the coal industry is so tightly organized that it would not allow advantages to domestic consumers and that consequently there is no use in lowering rates on fuel. It has been pointed out that this opinion exists, and, regardless of its merits, it has to be met.

Will Continue Efforts

The lake front iron and steel interests consequently propose to continue their efforts to get lower rates, despite the discouragements they have met. With this purpose in mind, they have begun preparation of a formal complaint. It is probable it will be filed with the Interstate Commerce Commission the latter part of the present week. Reports are to the effect that it will formally ask the commission either to reduce fuel rates proportionately to the cuts made in rates on iron ore from lower Lake Erie ports to interior furnaces, now that the life of these rates has been extended to March 31, to establish minimum rates on these ore shipments and adjust fuel rates in their proper relationship with them. Such action by the commission, if taken, probably would mean raising the level of the ore rates somewhat and a tapering off of the fuel rates accordingly. That this would be opposed by the interior furnaces is believed to be altogether likely. These furnaces plainly would rather see fuel rates brought down to the proper relation with the present lowered ore rates. Because of the idea of a minimum ore rate proposal, there is seen a possibility of difference within the steel industry, but it is stated that efforts will be made to avoid such a development.

An Interesting Suggestion

The suggestion for the fixing of minimum rates on ore, if it finally is determined to make it, would prove interesting. Previously to the enactment of the Esch-Cummins law, the commission had no authority to fix minimum rates, being empowered to establish maximum rates only. Extension of the authority was allowed by Congress in order to meet the requirements of Section 15a of the transportation act which provides that the commission must "initiate" rates that will give the railroads at least 5½ per cent in the period between the date of the act and March 1, 1922.

Opponents of any upward adjustment of ore rates from Lake Erie ports express serious doubt that the commission would establish minimum rates. But if

such a plan is considered, it is said, they will attempt to frustrate it by showing that the present rates yield a good return to the carriers and that higher levels are without justification. It is believed in the trade, according to reports received here, that the railroads will continue the present ore rates beyond March 31 because, as the situation now stands, they apply only to dock ore, and unless they are extended, no benefit would be derived on the great bulk of the movement in the way of direct shipments which begin with the opening of lake navigation. The fact that ore rates in Southern territory were permanently restored on Nov. 26 to their levels existing before the general increase of last August also is cited as another reason for maintaining present rates on Northern ore shipments. The Southern rates, it will be recalled, were increased 25 per cent as against the 40 per cent increase applicable in the North. The Southern Railroad attempted to go farther than other lines in that territory by also reducing rates on limestone, but the commission denied that part of the application.

Hearings in Chicago

But the trade is not contenting itself with the decreases that have been made in ore rates. The Lake Superior Iron Ore Association will push its complaint against rates on ore from upper mines to Lake Superior docks. Hearings in this case will begin in Chicago on Dec. 7, before Examiner Hosmer, and the complainants assert that the reductions in rates from lower ports and in the South have strengthened their case, which, they point out, was already strongly in their favor. Reductions in the rail rates from mines to upper docks would necessarily benefit lake front furnaces, as well as further benefiting interior furnaces, as contrasted with the recent reductions in rates from Lake Erie ports which benefit only interior consumers.

The lake front interests, however, are insistent that the fuel rates be lowered and whatever may be done as the result of the general investigation by the commission to begin Dec. 14, they will press their claims for the desired reductions.

Investigation Will Be Sweeping

This investigation will be sweeping in character. All shipping interests are expected to take advantage of it and lay their arguments for lower rates before the commission. The iron and steel trade, it is believed, will take a prominent part in the proceeding and urge the necessity of general relief on rates on all manufactured products as well as on raw products. At the same time, it is doubted that if reductions are made as the result of the investigation they will be adequate to suit the trade. Moreover, it is feared that action will be considerably delayed. To comprehend such a scope the investigation would have to take on a broad aspect, but it is confidently believed it will assume such proportions, despite the limitation in the order instituting the proceeding. The investigation is to be conducted by the commission on its own behalf of the reasonableness of the present level of rates, and it has been indicated that the commission has some views on the subject that are not shared by the railroads and by reason of this has ordered the investigation.

One matter that is to be threshed out, it is said, will deal with the relationship between wages and railroad rates, and while the commission has no authority to determine wages, the two subjects are so closely interwoven that it is expected the investigation may make it plain whether wages or rates should be reduced

first. The order of the commission says that the investigation is to "determine whether and to what extent, if any, further general reductions in rates, fares, and charges can lawfully be required by order or orders of the commission under Sec. 1, or other provisions of the Interstate Commerce act, upon any commodities or descriptions of traffic." In the event such a limitation is strictly enforced, the discussion at the investigation will be of law questions, with only incidental reference to facts. Even with that limitation, however, it is pointed out that it will be possible to bring into the discussion the facts to show the poor financial returns of any or all industries because Sec. 1 is specifically mentioned. This section requires all rates to be just and reasonable and forbids those not in conformity with that rule. There is a division of

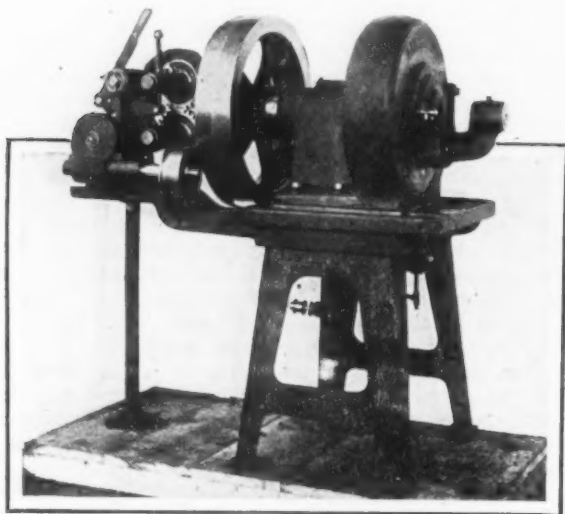
opinion as to whether a rate to be just and reasonable to both carrier and shipper need necessarily be one that assures a reasonable return to the carriers. There is a school of thought that the carrier must make its rates so that the traffic may move freely. Plainly this would allow a wide range of data to be brought before the commission at the hearing.

Under section 15a, it is believed, the carriers will hold that the order cannot be construed as authorizing the commission to reduce rates for economic reasons, making the point that such action would prevent a return of 5½ per cent. The carriers also have always maintained that they have the power to lower rates when they consider them too high to move traffic for the same reason that they have the option of meeting or not attempting to meet competition.

New Langelier Swaging Machine

A swaging machine, designated as No. 3½AT4, of the roller cage type, which differs in construction and action from its standard machines, has been brought out by the Langelier Mfg. Co., Arlington, Cranston, R. I. In this machine the head is bored out to receive a driven-in ring of hardened steel which provides a running fit for the revolving cage carrying the rolls, whereas in the standard type the rolls are inserted directly in the head proper of the machine.

The spindle running bearing has loose perforated bushings, the perforations acting as small oil reservoirs, to facilitate lubrication of the spindle. The



Intermittent Rotation of the Cage Retards the Blow, Resulting in a Squeezing Action. The roll feed attachment withdraws the stock after swaging

flywheel is held on the spindle by a key and a two-bolt clamp hub, this having been found a favorable method to meet the quick, sharp strokes it has to withstand. The spindle head is slotted for receiving the hammer blocks, which are of hardened tool steel, and are bored at their upper ends for carrying the hammer-block rolls, which also are of hardened tool steel. The lower ends of the hammer blocks are slotted in a manner that enables them to carry the dies in a sliding fit.

A spindle plate, screwed to the front end of the spindle, retains the different working parts in place and provides a means of limiting the opening of the dies during the expanded period of their cycle of operations. This is attained in the following manner: The hammer-block rolls, which are a snug running fit in the hammer blocks, are provided in the front end with a concentric female cone. The spindle plate has cone-pointed adjusting screws with lock nuts by means of which the die opening is adjusted. The strike of the dies is regulated by inserting shims of required thickness, placed between the hammer blocks and dies.

When the machine is put in motion, the spindle

rotates and the centrifugal force tends to throw the hammer blocks out from their center, thus enabling the dies to open. The head rolls in the revolving cage project toward the center beyond the path of the hammer-block rolls, and, as they contact, an intermittent rotation of the cage is caused retarding the blow and thus resulting in more of a sliding or rather a squeezing action. This action differs from that of the company's standard type of machine, in which the blow is direct and consequently much more sharp. The slow blows are said to be best adapted to solid work, as they permit the stock more time to flow.

The roll feed attachment is shown in the illustration. Its purpose is to withdraw the stock with a steady and smooth motion from the machine after swaging, thereby maintaining of the straightness of the work. The capacity of the attachment is from 0.375 in. to 1.313 in. and it will size any stock within that range. It can be moved to and from the end of the spindle over a distance of 5 in. by adjustment of the screw shown under the base plate in the illustration. The feed of the rolls can be changed from 30 in. to 45 in. per min. by changing the pulley on the spindle.

The rolls with their driving gears are mounted on crank arms, fulcrumed in the stand of the attachment. The lower roll arm is held stationary by a stop set screw which can be adjusted when required. The upper roll is pressed into the lower by a lever, and tension is maintained by an adjusting spring. The guide bushing on the end of the machine spindle is for guiding the stock into the center of the rolls, serving also to prevent the stock from catching in the gear teeth. The rolls can be opened instantly by means of a lever and changing of the drawing rolls can be accomplished quickly and conveniently.

Deferred Building Projects

ST. LOUIS, Nov. 29—Big building projects, aggregating in cost \$15,270,000, which would be started between January and June of next year if wages and building material prices were reduced to a reasonable level, so that investors would have an adequate safety margin for their money, were reported by Nelson Cunliff, Director of Public Welfare, to the joint committee representing the Building Trades Council and the Master Builders. Cunliff is representing the public in the negotiations to resume building operations here.

Cunliff considered only projects of \$200,000 and upward. Festus J. Wade, president of the Mercantile Trust Co., said that he would guarantee for one year an interest rate on building projects not to exceed 6 per cent and would reduce the commission on loans from 3 to 2½ per cent. The conferences will be resumed to-day.

The John Eichleay, Jr., Co., Pittsburgh, submitted the lowest bid, \$36,000, for the construction of a survey and inspection motor vessel for use in the Mississippi River below St. Louis, for the Mississippi River commission. The boat will be 76 ft. long and will be equipped with two 60 hp. Diesel engines.

GRAY CO. OFFERS NEW PLANER

Features Include Improved Control and Lubrication—Helical Gear Table Drive

A planer of new design, designated the new Gray maximum service planer, incorporating novel features intended to increase the production capacity of the machine, has been brought out by the G. A. Gray Co., Cincinnati. Reducing the cost of planer work by the greatest possible conservation of the operator's time was, it is said, the guiding thought behind the new design. Centralized control and simple and natural movements in operating the various devices is an outstanding feature, one movement in most cases accomplishing the desired result.

The new Gray feed is called the Cantslip and as the name implies, is positive. Adjustment is by turning a knob at the operator's end of the rail until the required feed is indicated on the graduated dial, a partial turn of the wrist giving any feed from 0.01 to 1 in. in steps of one hundredths of an inch. The feed dial is automatically locked as soon as the fingers are removed from the knob. As shown in the illustration the feed mechanism for the rail heads is mounted on the end of the rail; that for the side head is mounted on the head itself, and thus is always within convenient reach. Rail-head and side-head feeds are entirely independent so that one can be changed without affecting the other. Feed changes may be made while the planer is running. Changing the feed it is pointed out is as simple as turning a door knob.

The rapid traverse embodied in these planers is applied to the side-heads as well as to the rail-heads. To move a head the operator simply shifts one lever, which disconnects the feed for that particular head, engages the rapid traverse mechanism and starts the small motor in the proper direction. Moving the lever back to neutral throws out the rapid traverse clutch, stops the motor and re-engages the feed. It is not necessary to make use of a separate starter to start the motor, nor does the motor run while not actually in use. No part of the rapid traverse mechanism is in motion unless a head is actually being moved.

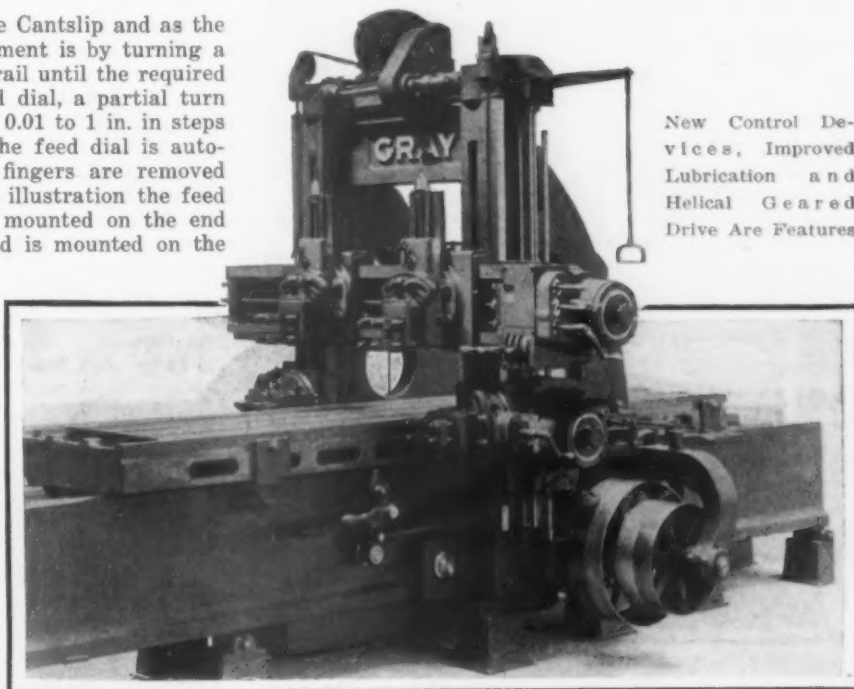
As the traversing mechanism is entirely separate from the feed mechanism one head can be rapidly set for the next cut while the other head or heads are still feeding. Throwing in the traverse mechanism automatically disconnects the hand cranks. The levers for actuating the rail-heads are at the end of the rail, the lever for each side-head is on the head itself, as shown in the illustration. Shearing pins safeguard the traverse mechanism in case the rail-heads are accidentally jammed together. Safety stops obviate the possibility of lowering the side-heads too far.

To elevate the rail the operator pushes up a stirrup hanging near the end of the rail; to lower the rail he pulls it down. The stirrup is locked in the neutral position. A quarter turn of the wrist unlocks it. As this stirrup is suspended from a universal joint, the operator can stand out in front of the rail where he can see the position of work and tools. The control is said to be so perfect that the rail can be set to a line. The motor that operates the rapid traverse also furnishes the power for the rail setter. One movement engages the elevating mechanism and starts the motor. Bringing the lever to the neutral position disengages the elevating mechanism and stops the motor. Safety stops obviate the possibility of raising the rail too high.

Turning a crank on the operator's end of the rail releases or tightens the clamps that lock the rail to the housings. The automatic adjustment insures that the rail is clamped equally rigidly at both ends. The rail is locked to inside of the housings. This greatly stiffens the rail, as it shortens the length subject to torsional

strain. A moderate pull on the crank clamps the rail even more firmly, it is claimed, than was possible with the old-fashioned outside clamps, tightened with a wrench.

As the lever operating the rail setter is also on the operator's side of the machine the planer hand can release his rail, raise or lower it and reclamp it without moving away from his operating position. On planers of the old type, the operator first loosened the clamping bolts on the front side of the machine; then walked around the end of the planer and loosened the bolts on the other clamp; then he operated the rail elevating lever on the rear housing and raised or lowered his rail. Then he tightened the bolts in rear clamp, walked around end of machine to right side and retightened



New Control Devices, Improved Lubrication and Helical Geared Drive Are Features

the bolts in front clamp. Getting the bolts equally tight was entirely a matter of "feel" on the operator's part.

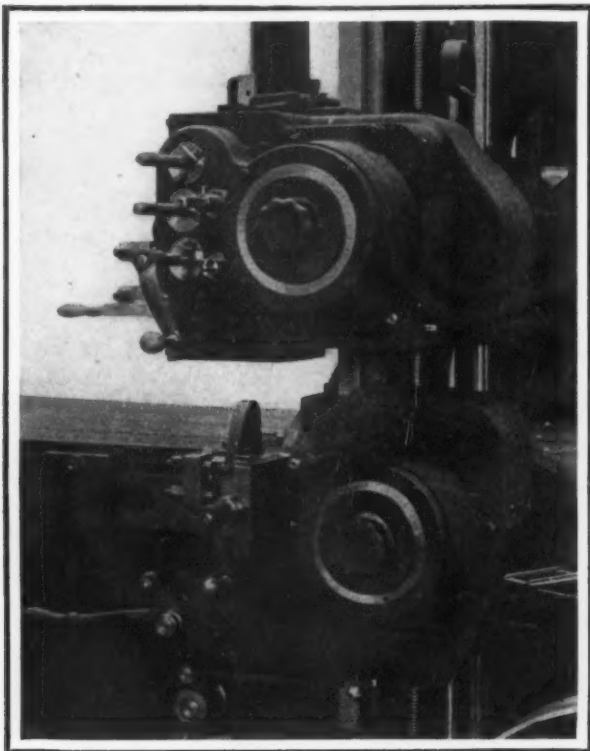
The net results of these improvements is to bring the control of practically all of the functions of the planer to the operator's usual position. Besides the raising, lowering, and clamping of the rail, as described, he can, without moving from his position, set the feed on rail or the right hand side head; traverse either rail-head or the right hand side-head quickly by power, set the micrometer collars on the rail screws so as to measure accurately the travel of the tool, and of course, use the tumbler which controls the movement of the table. In doing these things he is in position to watch his tools and so avoid accidents. This is of importance, it is pointed out, not merely because it adds to the convenience of the operator but because the elimination of physical effort makes it possible for him to work fast without fatigue, and will result in more accurate work because he is alert and not tired.

The bed of the new planer is made full length; that is, the working surface of the table never overhangs, even when taking the maximum stroke. In this way the table is always rigidly supported even when run way out to the front end of the planer for setting up work. By eliminating the table overhang, the wear that otherwise takes place at the ends of the bed is eliminated and the accuracy of bed and table maintained and better work made possible. Incidentally, there is no dripping of oil on the floor from overhanging table V's or oil pans. The table is of box section, with an uninterrupted center wall running the entire length of the table and tying the top and bottom plates rigidly together. This design also prevents endwise springing due to peining action that occurs when heavy work is clamped. Stop-pin holes open into the openings of the table and are accessible from the outside.

All of the driving gears run in a bath of oil. An oil

pump is direct-connected to the drive shaft and delivers oil not only to the V's but also to all of the drive shaft bearings. The pump is of the reversible type, operating on the return as well as on the cutting stroke.

From the pump the oil flows through a filter, thence to a hole in each V at the center of the bed. Each table V has a large oil channel running the full length of the V but closed at the ends. From this large channel the smaller supplementary oil grooves carry the oil to all parts of the bearing surface. By this means



The Feed Mechanism for the Rail Heads Is Mounted on End of the Rail; That for the Side Head Is on the Head Itself, As Shown

the oil supply is kept constant at all points regardless of the relative position of the table, since the pressure is instantly transmitted through the large oil channel. If, for instance, short stroke work is being done near one end of the table, the oil does not have to flow through a long tortuous groove of limited area to reach the far end of the table.

The surplus oil dripping from the table V's and rack flows through a screen into a settling basin at each end of the bed. The oil then flows to the center of the machine, through the pump and a filter so that only clarified oil passes through the oil system. As the table never projects over the end of the bed there is no dripping on the floor. The oil pipes are inside the bed.

As previously stated the driving shaft bearings as well as the V's are oiled by a forced feed lubricating system and require practically no attention. To simplify the oiling of other parts, central oil wells have been placed on rail and side-heads. Oil pipes lead from the central well to the different oil holes, so that the operator merely fills this large reservoir instead of many separate oil cups. This not only saves a great deal of time but also obviates the danger of overlooking inconspicuous oil holes. From the reservoir the oil is drawn through wicks by capillary attraction so that only clean oil reaches the bearings.

New "Gray-Gear" Drive

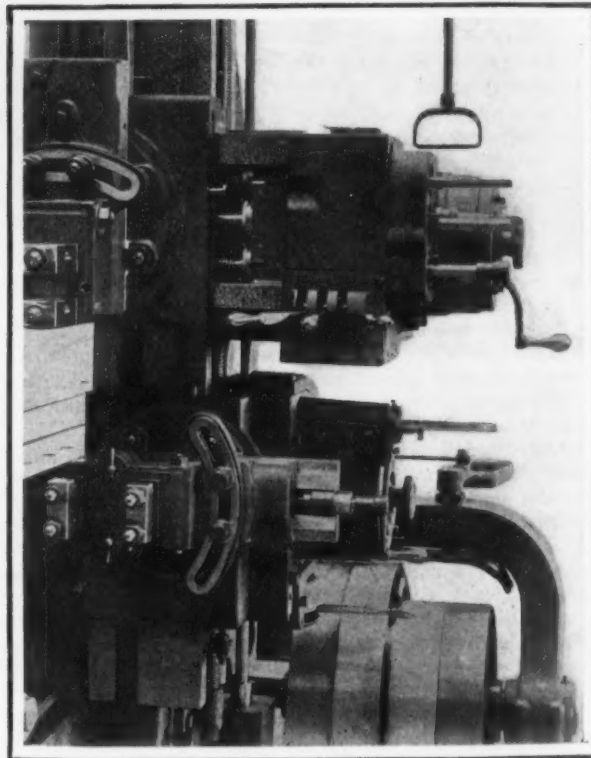
Probably the most important part of a planer is the gearing which drives the table. The Gray maximum service planer is provided with a new system of gearing in which advantage is taken of a number of properties of involute helical gearing to produce a drive of unusual smoothness and power.

Planers have heretofore been built with herringbone or helical gears for the first reduction, but the new

Gray planer has helical gears throughout. The Gray company states that a train of planer gears having one or more pairs of spur gears cannot give the results which are obtained by the use of properly proportioned helical gears throughout, that is, from pulley shaft pinion to table rack.

Helical gears produce end thrusts. Advantage is taken of this fact to cause the end thrust of the bull gear and its pinion to counteract the side thrust of the tools when cutting. Moreover, the diameters and helical angles of the remaining gears of the train are so proportioned that their end thrusts very largely balance one another. Bronze thrust collars, provided with forced lubrication, take the slight residual end thrusts. Particular attention is called to the helical table rack which is of unusual width of face, giving great strength. The helical rack is arranged so that the end thrust of the bull pinion, which amounts to about one-tenth of the driving force, opposes and compensates for the side thrust of the cutting tools when they are being fed away from the operating side of the machine, a condition which obtains at least 90 per cent of the time. As the tool pressure increases, the power required to drive the table and the resultant balancing thrust of the bull-pinion also increases proportionately. This, it is said, equalizes the pressure and wear on the two sides of the V's, whereas with a rack of the spur form the pressure and wear are greater on one side of the V's than on the other, due to the side thrust of the cutting tools. It also overcomes the tendency of the tools to push the table up the side of the V's.

For the convenience of the operator, planer work is usually placed close to the operating, or so-called right



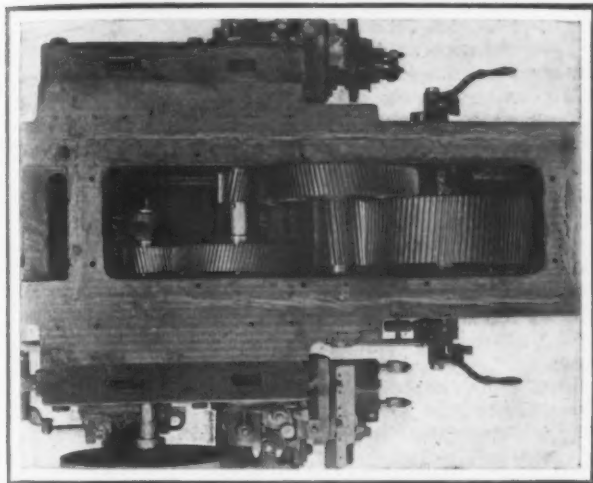
Rapid Traverse Is Applied Also to the Side Heads. Levers for actuating rail heads are at end of rail. Lever for side head is on the head itself

hand side of the machine. It is therefore desirable that the line of action of the driving force should be placed slightly toward the right hand side of the machine, so that the lines of action of the cutting tool and the driving force shall coincide as nearly as possible. The rack is accordingly so placed.

It may be noted that the table rack is cut with a very low pressure angle. This, it is pointed out, greatly reduces the tendency of the bull gear to lift the table and makes unnecessary hold down gibs or other devices for preventing this action. In order to obtain maximum torsional stiffness; reduce the strain on the shafts, and insure concentricity of the gears, the gears are not keyed to the shafts, but are pressed on and keyed to

the pinion bosses. The gear teeth are then cut, thus insuring not only rigid and permanent connection, but also absolute truth of mounting.

To provide correct tooth action, teeth of true involute form, cut by a generating process, are employed. In order to avoid interference and imperfect tooth forms, and to obtain great smoothness of action and stronger teeth, the pinion teeth are so cut that the greater part of the tooth face lies outside the pitch circle. The teeth have a low pressure angle, are cut full depth, and have a short arc of approach and long arc of recess, giving high efficiency, and greatly in-



The New Drive Has Helical Gears Throughout

creasing the number of teeth in contact and the smoothness of action. The action of a tooth having a long arc of recess compared to one with a long arc of approach is analogous to the action of dragging the end of a pole behind you compared to pushing it ahead of you.

This design, it is said, also has the advantage of permitting the use of pinions of larger diameters and stronger tooth form without the disadvantage which attend the use of stubbed teeth, high pressure angles and low gear ratios.

In other words, the special form of tooth employed is distinguished by its full length, low pressure angle, short arc of approach and very long angle of action. The last feature greatly increases the number of teeth in simultaneous contact, reduces the specific pressure at the lines of contact, gives large and strong pinions, great smoothness of action, long life, and quiet action, and is said to produce work of unusual smoothness and accuracy of finish.

"Your eyes can't bear to look at the sun—then don't let other bright lights shine into them," warns the National Safety Council in a recent poster. The photograph depicts a machinist at work on a metal-working machine with the lamp focusing the light upon the work, his eyes being protected. Continuing, "This is the right way to use a lamp. The reflector keeps the light out of your eyes and on the work. Where the overhead lighting is strong enough, you don't need a lamp at your machine. Light is to see by—not to look at!"

Constantly broadening demand for fireproofing and reinforcing materials will require substantial enlargement of such capacity during the next few years, in the opinion of Wharton Clay of Chicago, commissioner of the Associated Metal Lath Manufacturers. In a talk Nov. 22 before contracting and building interests at the plant of the General Fireproofing Co., Youngstown, Ohio, Mr. Clay pointed out the growing requirements for such materials from the building industry throughout the country.

The *National Coal Mining News*, Cincinnati, has issued a coal freight rate sheet giving a large number of freight rates so arranged that they will be available for reference for those engaged in the shipping of coal.

REDUCED SHEET OUTPUT

Pipe Plants, However, Show Gain in Mahoning Valley—Blast Furnace Situation Unchanged

YOUNGSTOWN, OHIO, Nov. 29.—In the face of somewhat steadier buying in some lines, steel production still shows weakening tendencies in the Mahoning Valley, particularly felt in sheets, though losses in this direction are offset by gains in tube mill production. Eleven of the Valley's 17 independent pipe furnaces are fired, but only 58 of 113 sheet mills are active, as compared with 62 the week before.

The Republic Iron & Steel Co., which operated 13 sheet mills last week, has reduced the number to six. In operating its sheet mill plant at Niles, the company maintains the new units on the active list in preference to the old when business does not warrant larger production. The new mills are low-cost units. The Republic company is rolling an accumulation of bar orders at its Haselton bar mill.

Addition to Bessemer capacity is made by the starting of the Bessemer department of the Youngstown Sheet & Tube Co. On the other hand, open-hearth furnace operations register a decline, from 42 of the week before to 39 this week, out of a total of 66.

Sheet mill capacity of the Sharon Steel Hoop Co. at its Haselton plant, Youngstown, is unoccupied this week, while the Trumbull Steel Co. has only three sheet mills at Warren engaged. The sheet and tube company continues to operate 15 sheet mills, Brier Hill Steel Co. 16, Newton Steel Co. 10 and Falcon Steel Co. six.

Puddle mills of the Sheet & Tube company are at only 30 per cent this week, though the large puddling department at Girard of the A. M. Byers Co., Pittsburgh, is running close to normal.

The blast furnace situation in the Mahoning Valley is unchanged, with 11 of 25 furnaces blowing, including five in the Ohio Works group of the Carnegie Steel Co., two of the Sheet & Tube company, and one each of the Republic company, Brier Hill company, Sharon Steel Hoop company and A. M. Byers Co.

Of the 11 active tube mills, six are being operated by the Youngstown Sheet & Tube Co. and five by the Republic Iron & Steel Co. In both cases they are being supported by partial skelp mill production.

Experiments With Ball and Roller Bearings

Technological Paper of the Bureau of Standards, No. 201, entitled, "Friction and Carrying Capacity of Ball and Roller Bearings," discusses experiments undertaken by the Bureau of Standards, at the suggestion of the Navy Department, to determine the maximum safe load, and the static friction under load, of ball and flexible roller bearings. Tests were made on balls of 1.00, 1.25, and 1.50 in. diameter in grooved races and on rollers 1.25 in. in diameter and 5.25 in. long in flat and cylindrical races. The ratio of friction to load is practically constant and equal to 0.00055 for all three sizes of balls up to a "critical" load which varies with the diameter of ball. A similar "critical" load, 25,000 lb., was found for the roller bearings with a ratio of friction to load equal to 0.00075.

Caucasian Manganese Ores

It is reported that the Temo Co. of the Caucasus has conferred upon the Dutch firm of Vlessing & Co. the sole rights of disposing of its manganese ore output, says the *Metal Bulletin*, London. The Temo Co. is an association of mines in which British, French, Swiss, Armenian, Georgian and Dutch capital is interested. The concessionaires are to despatch plant to Batum and Poti with a view of production on a pre-war scale. The Russian Soviet Government has, it is understood, confirmed the agreement and promised its support.

Purchasing Foundry Irons by Specification

Standard Methods for Sampling—Defects in Iron Due to Furnace Irregularities—Iron Analyses Grouped by Geographical Sections

BY Y. A. DYER

WITH the advent of sound foundry practice, the purchase of pig iron by fracture grading has been fast relegated to the "dark age" periods. Strange to record, however, the new system of purchasing by analysis was fostered practically single handed by the foundrymen, the furnace interests being, with some few exceptions, inclined to cling tenaciously to the antiquated fracture grading system. Now that the change has come, furnace companies desiring to remain in the field, as producers of foundry iron, must either adopt furnace practise and methods which will insure the production of pig iron of desirable chemical composition, or else enter the market as basic pig iron producers, for the manufacture of steel.

It is necessary for the foundryman to decide which element or elements shall be the controlling factor in the pig iron which he desires to purchase, and then specify accordingly. Thus, if it should be desired to specify an iron with silicon 2.25 per cent, sulphur 0.04 per cent, phosphorus 0.50 per cent, manganese 0.60 per cent and total carbon 3.60 per cent, it must be borne in mind that the following variations are allowable:

Silicon	0.25 per cent up and down
Sulphur	Maximum percentage to be specified
Phosphorus	0.20 per cent up and down
Manganese	0.20 per cent up and down
Total carbon	Minimum percentage to be specified

Standard methods for sampling pig iron and cast iron, formulated by the United States Bureau of Standards, have been adopted by the American Society for Testing Materials, and are given below:

1. One pig to be selected at random from each four tons of iron, and ten pigs (40 tons representation) to constitute a unit of sampling.

2. The surface of each pig selected to be cleaned carefully, and the skin removed by emery wheel at the center of upper face of each pig. Drillings to be taken from one hole made with twist drill from top to bottom of each pig.

3. Drillings from the entire unit to be weighed, sifted to two or three portions of different fineness; the portions weighed and proportional parts taken in making required determinations.

In submitting samples to a chemist for determination, it should be understood that the "standard methods for determining the constituents of cast iron," adopted by the American Society for Testing Materials, are to be used by both foundry and furnace companies, as well as umpire chemist in case of dispute.

Defects in Pig Iron

When "off" pig irons are detected by the foundryman, they should again become the property of the furnace company, or else the price be reduced to a figure whereby the iron may be used for the class of work to which it is suited—weights, washers or less important bulky castings. Volumes have been written on the subject of bad castings and remedies therefor, but it seldom occurs to foundrymen (further than the conclusion that the "iron is bad") that possibly the basic trouble may sometimes be due to an off grade of pig iron which is being used; that is: an oxidized iron.

For this reason it may be of more than passing interest to the foundryman to have some knowledge of the detrimental factors of common occurrence in the production of foundry pig irons—first, to gain an insight into the irregularities of furnace conditions which may produce an "off grade" iron; second, as information which may assist in the location and correction of troubles likely to occur in foundry mixtures, by the use of such pig iron, and which seem difficult to locate

after cupola practice and foundry conditions shall have been checked and found to be correct.

This chemical defect, which sometimes exists in foundry pig irons, does not appear to the foundryman by a casual reference to the routine chemical analysis or fracture tests; that is: by reference to determinations of carbon, silicon, sulphur, phosphorus, manganese and noted fractural structure of the metal. The oxidized condition of the iron is chargeable to irregular blast furnace operations and control, and when such iron is not noted and relegated to the "off grade" pile by the furnace company, it is handed down to the foundryman. In turn, its deleterious effects are reflected all down the line of foundry operation.

Oxidized Irons

Irons which contain this very undesirable defect are often referred to by the foundryman simply as "bad iron." Technically they are "oxidized" irons—due to furnace irregularities in the form of scaffolds and slips, too heavy burden or undue driving of the furnace, by reason of desire on the part of operator to boost production; or to certain ill designed or faulty lines and construction. "Scaffolds" may cause serious trouble and detriment to the grade of irons subsequently tapped.

When a scaffold finally "slips," a large quantity of iron oxide (the ore not having had time to complete its travel through proper temperature zones of dissociation, or decomposition) may be precipitated into the hearth of molten metal. The result is a pig iron of very inferior quality. Its grading and shipment should be watched closely by furnace operators, so that it will not be applied on orders calling for first-class iron. The presence of iron oxide, when excessive, is very noticeable on the tops of runners, sows and pigs; and excessive blow holes occur at the surface and throughout the metal.

Excessive blowing and driving of a furnace have their bad effects on the grade of metal, by creating a tendency to oxidize the iron; that is: by forcing the gases through the stock, or material, at such a high rate and pressure that they do not have proper time to remain in their respective critical zones, for uniform distribution and functioning of their carbonizing and reducing agencies on the iron oxide ores; also by working the stock through the furnace too fast. The slow driven—medium or small size—blast furnace, working on easily reduced ores, produces the most desirable grades of foundry pig irons.

Another form of "off iron" (high sulphur, low silicon) may be produced by the introduction of water into the furnace through a leaky cooler or tuyere, causing a cold hearth. The slag becomes less basic, the reduction of silicon decreases and sulphur increases.

Watching the Ore

An interesting source of helpful information to the foundryman is a knowledge of the character of raw materials used by the furnaceman in making the particular iron which he sells—more particularly as to the ore. The limonites, or brown ores, are most easily reduced in a furnace, compared with the more refractory hematites, therefore less driving of the furnace is necessitated.

As an illustration of the smooth and complete working of a furnace using large percentages of easily reduced brown ores, reference is made to the temperature at which decomposition begins and ends in the use of limonites and hematite ores. According to Hempel and Schubert, decomposition of the carbonates and oxides in brown ores begins at 932 deg. Fahr. and ends at about

2336 deg. Fahr.—the range of temperature of effective carbon deposition. Decomposition of hematites begins at about 2282 deg. Fahr. and ends at about 2732 deg. Fahr.

Therefore, decomposition of brown ore begins between 10 and 12 ft. below the throat, or top of furnace, and is completed before it reaches the usual danger points of scaffolds and slips. Decomposition of the hematites does not begin until this danger zone is reached, then extends far down into it; and is not completed until practically the fusion zone (point of concentration of elements) is reached—hence the least disturbance caused by slip may precipitate iron oxide (unreduced ore) into the hearth.

In addition to this, decomposition does not begin in the hematites until the ore is far down in the true zone of carbonization. Again, the brown ore, in its preparation, passes through a wider range of temperature, consequently distance of travel in the furnace, than the hematite ore. This fact, in addition to the more porous nature of the brown ore by reason of losing its hygroscopic water, permits of a more complete deoxidation and proper carbonization of the iron sponge. The net result is a more uniform and superior metal.

Iron oxide is soluble, to a moderate extent, in liquid metal, but as a whole it does not remain dissolved while the iron solidifies—hence it separates out and forms on top of pig or close beneath the surface. Iron oxide is probably directly or indirectly responsible for more foundry ills than any other agency. At times, unfortunately, a foundryman may receive from a furnace company iron which has been badly oxidized by irregularities in furnace practice; and in this manner a large percentage of iron oxide may be carried through the cupola and temporarily, at least, held in solution with the metal, or mechanically mixed with it.

Iron Analyses Grouped by Sections

Pig irons of the United States are grouped in practically six classes—charcoal, standard foundry and forge, basic, bessemer, malleable and special analysis. The first class may be subdivided into cold blast, warm blast and hot blast charcoal irons, manufactured at northern, eastern and southern centers. The second class may be subdivided into standard foundry and forge irons manufactured at northern, eastern and southern centers. The third class consists of the basic irons manufactured in northern and southern centers; the fourth class, the bessemer irons manufactured at northern centers; the fifth class, the malleable irons of

the north; and sixth, the special analysis irons of the north, east and south.

Each iron producing section has its own analysis specifications. However, during the world war, there was created by the committee on steel and steel products of the American Iron and Steel Institute, Nov. 14, 1918, and approved by the President, a special foundry grading of iron equivalent to the following analyses:

	Percentages	
	Silicon	Sulphur
No. 1 soft	3.25 to 3.74	0.05 and under
No. 1 foundry	2.75 to 3.24	0.05 and under
No. 2 soft	2.25 to 2.74	0.05 and under
Base. No. 2 foundry	1.75 to 2.24	0.05 and under
No. 3 foundry	1.25 to 1.74	0.05 and under
No. 4 foundry, or forge..	0.75 to 1.24	0.05 to 0.08

No. 2 soft southern iron is equivalent to the old grading of No. 2 foundry, and in numerous instances the higher silicon, 2.25 to 2.74, is still shipped by Southern furnaces on No. 2 foundry orders. Manganese and phosphorus content are adjustable according to customary regulations peculiar to each district.

Following is a fair average of grouped analyses covering pig iron production in the United States:

Foundry:	Percentage of			
	Silicon	Sulphur	Phosphorus	Manganese
Northern	1.25 to 3.75	0.03 to 0.05	0.40 to 0.90	0.40 to 1.00
Eastern	1.25 to 3.75	0.03 to 0.05	0.40 to 0.90	0.40 to 1.00
Southern	1.25 to 3.75	0.03 to 0.05	0.70 to 1.50	0.20 to 0.60
Forge:				
Northern	0.75 to 1.25	0.05 to 0.08	0.40 to 0.80	
Eastern	0.75 to 1.25	0.05 to 0.08	0.40 to 0.80	
Southern	0.75 to 1.25	0.05 to 0.08	0.70 to 1.50	
Basic:				
Northern	1.00 max.	0.05 max.	0.50	0.75 to 1.50
Eastern	1.00 max.	0.05 max.	0.50	0.75 to 1.50
Southern	1.00 max.	0.05 max.	0.70 to 1.00	0.20 to 0.60
Bessemer	1.00 to 3.00	0.05 max.	0.10 max.	0.40 to 1.50
Malleable	0.75 to 1.75	0.05 max.	0.20 max.	0.40 to 1.50
Special foundry:				
Northern	1.25 to 3.75	0.02 to 0.05	0.15 to 0.40	0.40 to 1.25
Southern	1.25 to 3.75	0.02 to 0.05	0.50 to 0.60	1.00 to 1.50
	1.24 to 4.25	0.05 max.	0.40 to 0.90	1.00 to 4.00
Charcoal:				
Northern	0.10 to 2.50	0.01 to 0.03	0.15 to 0.28	0.25 to 1.30
Southern	0.10 to 1.75	0.02 to 0.03	0.40 to 0.60	0.20 to 1.25
Cold blast	1.50 to 2.00	0.01 to 0.02	0.35 to 0.45	0.30 to 0.40
Special low phos.	0.75 to 1.25	0.03 max.	0.03 max.	0.50 max.
Washed metal	Nil	0.01 to 0.04	0.01 to 0.04	Nil

Indicating the Business Drift

THE IRON AGE has called attention now and again to what the Department of Commerce is trying to do in new ways to help business. What is said below deals with what it has set out to do with its publications.

Manufacturers in all lines are making a greater and more intelligent use of the facts concerning production, consumption and prices in the country's leading industries than at any previous time. Never have business journals had so many requests for the statistics of production in previous years. Business men who have never thought much before of charts and diagrams are now gathering together all available data, having evidently made the resolve to be thorough students in the future of the curves of production and prices, stocks on hand and shipments to market. The Department of Commerce is meeting the call for trade facts by an extensive survey that has already proved its value. Each month the department brings out a *Survey of Current Business* which effectively supplements the well-known *Commerce Reports*. The latter publication is a weekly survey of foreign trade, which carries in addition much other information, with reports from American consular officers and representatives of the Department of Commerce in foreign countries. The price is \$3 per year.

The *Survey of Current Business* consists in part of statistical tables which cover every field of the nation's agricultural, manufacturing, commercial and financial

activities, but the tables are prefaced with a word summary or interpretation that is calculated to have the wide appeal, leaving for the special studies of the economist and statistician the facts on which the summary is based. It is planned hereafter to publish the detailed tables quarterly, owing to the great accumulating mass which is coming into the department, and the expense of full monthly publication, though the figures for the intermediate months will be supplied thus to keep the reader up to date. Briefly stated, the statistics include a price chart showing the 1913 averages, the peak prices of the war and the prices at the present time; production over a period of years, and month by month in recent years; foreign trade of different countries in the years since the war. There are many pages of transportation statistics and of figures of banking and finance. Price index numbers cover many pages. The metals and metal products pages cover pig iron, steel, copper and other metals, with production statistics, stocks and prices in monthly averages for the years 1913 and following.

All this work, which is of utmost value to the business man of the country in this transition period, takes money. Secretary Hoover has secured in the main the appropriations he has asked for, but this statistical work cannot go on on the present scale unless the business man, for whom it is intended, comes to its support. The *Survey of Current Business* is \$1 per year. A great many remittances of \$4 should go from the iron and steel and metal working trades for these two valuable publications.

Why Investment in Industry Is Hazardous

President Biggert, United Engineering & Foundry Co., Tells Employees the Difficulties of Companies Owing to Irregular Operations

IN a statement to employees on current conditions in industry, President F. C. Biggert, Jr., United Engineering & Foundry Co., Pittsburgh, states that because of fluctuations in business industry is the most hazardous use to which capital can be put. He points out, by charts, that the United Engineering & Foundry Co., "during a period of nearly six years of the greatest prosperity any country has ever known, was able to produce at only 76 per cent of maximum capacity."

"If industry can operate at only 76 per cent of capacity in a period of unexampled prosperity," he inquires, "and if in only three years out of 12 it is possible to book business equal to capacity, at what per cent can industry operate on an average?"

"No person will deny that 50 per cent is the highest probable average," he contends.

"The first thing that strikes one in studying the situation is the rapidity and magnitude of the fluctuations of work on hand," states Mr. Biggert. "Early in 1916 we had around 320,000 hr. to produce and at that time our producing capacity was about 50,000 hr. per month, or something over six months' work ahead of the shops. This mounted by leaps and bounds until about the middle of 1917, when we had the greatest number of uncompleted hours at any time in the history of our company. At that time we had some 680,000 uncompleted hours, but in the meantime the Tod department at Youngstown had been acquired and our producing capacity would be placed at about 85,000 hr. We then had about eight months' work ahead of the shops. The uncompleted hours then fell off quite rapidly until about the middle of 1918. This drop was due to the demand for quick deliveries on nearly all work offered, and as we were already booked up for a number of months, we were not in position to take much of the work then offering.

"After the middle of 1918 our deliveries had been shortened somewhat and we took on another volume of work which pushed the uncompleted hours up to a very high figure. A little later in the year it became evident that the war would soon end and there was a falling off in demand for machinery. After the armistice there were cancellations of large contracts by the Government, and this produced the sudden slump of the early part of 1919. Then came the revival of business, which lasted through the latter half of 1919 and most of 1920, ending in the present serious depression."

Mr. Biggert characterizes the period of the war as representing the maximum possibility of operation of the company's plants. As its products were of importance in prosecuting the war, it was able to obtain the assistance of Government agencies in getting material and shipments, and was free from strikes and other interferences to steady operations.

"After the armistice production gradually dropped off," he explains, "first due to the cancellation of orders, and in the latter part of 1919 it was held down by the steel strike and the coal strike, both of which affected us through inability to obtain materials and fuel. For this year the average production was only about 55,000 hr.

"In 1920 the production gradually rose, but was held back during the early part of the year by car shortages, railroad strikes and car embargoes. During the latter half of the year we reached an average production of about 65,000 hr., but the average for the whole year was not over 60,000 hr. During 1921 there has been a gradual reduction of production due to lack of new work and the rapid completion of that on hand.

"In all this period of nearly six years we had ample work to do and we could have produced 5,225,000 hr. Instead of this we actually produced 4,040,000 hr., or about 76 per cent of our possible production.

"If this is true, there is an enormous waste going

on all the time, for every plant we build must have twice the capacity required to fill the needs of the country. We must build two plants to get the product of one. This is no new idea, but a fact which has been recognized for a long time. This is the source of some misunderstandings which have caused dissatisfaction and loss to those who invest and those who labor in industry. Persons who do not understand the effect of underproduction on the cost of production, criticise the policies of industry without taking account of these unavoidable fluctuations and their attendant losses.

"You will find that the man who believes our industrial system to be fundamentally wrong is invariably basing his reasoning on data from some particular industry and over a limited time. He may have selected a case where undue advantage has really been taken—such cases can doubtless be found. More probably he has taken a period during which the company has been prosperous and he has failed to allow for the inevitable time when conditions will be reversed. Our charts show the ups and downs of industry, and from them it is evident that the gains of a good year must be spread over several bad ones, for little or no gain can be made when production is at 50 or 60 per cent of capacity.

"As regards more uniform operation and more constant employment of man power, there is much to be desired, but no sudden change of system will improve these conditions. They can only be improved by gradual refinement of our present methods. There are real inequalities which can be lessened but never entirely eliminated."

Promise to Buy Rails

The mayor of Sydney, N. S., who was in Ottawa, Ont., recently interviewing Government officials with the object of securing business for the Dominion Steel Co., to relieve the unemployment situation, telegraphed to the citizens' committee that he had a satisfactory interview with Hon. J. A. Stewart, Sir Joseph Flavelle, chairman of the Grand Trunk Railway Board, and D. B. Hanna, president of the Canadian National Railways, the result being a definite promise of an early further order for 20,000 tons of rails and a strong possibility of still another contract for 15,000 tons.

In the Field of Labor

The average weekly factory wage in New York State was 54c. less in October than September, the State Department of Labor announces. Weekly factory earnings of workers were 15 per cent less in October, 1921, than in October, 1920.

Negotiations are under way between Cincinnati union foundries and their employees for a reduction in molders' wages from \$6 per day to \$5 per day of eight hours. The present agreement with the employees expires on Nov. 30, and the foundrymen feel that, with the competition keen from outside sources where lower wages prevail, the rate in Cincinnati should be cut. It is said that sentiment among the union molders is almost unanimously against the proposed reduction.

The labor barometer of the Employers' Association of Detroit, comprising 79 firms and two-thirds of the employment ability in Detroit, shows a net decrease of 1349 men employed for the week ending Nov. 22. The aggregate employment is 113,969, of which 68,051 are working on reduced schedules in 26 shops, averaging 40 hours per week.

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THE IRON AGE

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Steel Prices and Rail Freights

Iron and steel manufacturers have nothing to lose and much to gain from the inquiry the Interstate Commerce Commission is to make into the prices the railroads are paying now for steel and for all forms of equipment into which steel enters, as compared with the prices in effect in August, 1920. That was the month in which the 40 per cent advance in freight rates became effective. The investigation will be an important feature of the hearings that begin at Washington on Dec. 14 to determine the reasonableness or unreasonableness of existing transportation rates. A thorough canvass will be made of all the questions that have been under discussion in recent months relating to the cost of railroad operation, the influence of high freight rates on commodity prices, the extent to which high transportation charges are due to the excessive wage schedules of the railroads, the effect of the railroad policy of curtailing expenditures for road maintenance and equipment, the extent to which operating expenses have been reduced by cutting down forces and by reducing wages, the earning power of the carriers under present conditions—all the ground, in short, that has been covered in the effort of shippers, railroad workers and executives and the consuming public to find some solution of the railroad side of the pressing problems of deflation.

The iron and steel manufacturers will bring to the Washington hearing an abundance of evidence of the serious handicap imposed upon their industry by the present unparalleled charges for transportation. One of the phases of the Commerce Commission's inquiry relates to the percentage of the prices of rails and other steel products, as well as of railroad equipment, that is represented by transportation. Steel manufacturers will be able to show that the transportation cost of the nearly five tons of raw materials required for a ton of finished steel has practically doubled since 1913. For one Central Western steel company this freight cost, which was \$5.80 in 1914, is to-day over \$11.50 per ton of steel. The variations from these figures, due in some cases, particularly in the Pittsburgh district, to river transportation for a portion of the raw materials, will

not be great. In other industries the story is the same. Beginning with agriculture, all are burdened by excessive carrying charges, due in turn to excessive railroad wages, so that the farmer and the workers in every line of manufacture actually find themselves working for the members of the railroad labor unions.

Over against the 100 per cent increase in the transportation cost of a ton of steel, where do the market prices of steel works products stand to-day in relation to the prices of 1913? THE IRON AGE composite for the seven principal forms of finished steel (including rails) one week ago was 2.099 cents per pound, whereas for 1913 it averaged 1.663 cents per pound—an increase of 0.436 cents, or 26 per cent. The percentage increase in transportation cost of steel, therefore, has been nearly four times the percentage increase in the prices paid by the railroads for the steel entering into their tracks and equipment.

The Commerce Commission's inquiry should be welcomed by the steel industry, since it will bring out in an authoritative way the fact that steel prices have been so far deflated that profits have disappeared and heavy losses are the rule, and that there can be no expectation of a real turn for the better apart from a reasonable readjustment in the cost of transportation.

A unique development in the work of the American Society for Steel Treating had its inception last year in one of the New England districts where certain chapters started an educational lecture program at their monthly meetings. This year the movement has so far expanded that the society may be said to take the lead in active educational work among its members. A conspicuous example is the Philadelphia chapter, which has organized an evening course in metallurgy and heat treatment at Temple University. In the New York chapter a series of monthly meetings has been arranged, the program for which contemplates a progressive course in steel metallurgy and heat treatment. Each month an authority in a particular line gives the chief lecture, which is followed by questions and discussions. Brief abstracts are given also of the principal articles

on metallurgical subjects in the technical press. Other local chapters are adopting similar plans. Fostered by the national board of directors and by visits of the national president to local chapters, the departure promises greatly increased interest in the work of this enterprising society.

Tin Plate Revival Significant

The bright prospect for tin plate consumption in 1922 is not a detached and unrelated phenomenon. A principle is involved which with the exercise of judgment can be applied more or less to the course of demand in all steel products. The tin plate revival is due to the liquidation of stocks, and in the broad sense that is what causes revival in demand for any description of steel, when there has been a period of abnormally light demand.

In the case of tin plate, large stocks were carried over from 1920, stocks of tin plate, of containers and of prepared goods. A secondary development occurred in the spring of this year, whereby the mills, underrating the influence the stocks of prepared goods would have upon tin plate demand, accumulated stocks which they expected would be called for in the summer in addition to current production, while the outcome was that the liquidation of the tin plate stocks necessitated a very light production in the summer months, lighter than in the corresponding period for many years past.

The situation as to tin plate, containers and prepared goods is now fully liquidated and the prospect is that there will be a full consumption of tin plate in 1922, in keeping with the growth of population and the enlarged use to which tin plate is now put. Depression exists now in not a few lines of trade, and there is likely to be some depression next year, but production and consumption of tin plate are expected to be in close relation to the best records of the past, if indeed a new record is not made. That is because there has been thorough liquidation.

Of all finished steel products tin plate shows the shortest time interval from production to final destruction, hence tin plate can "come back" in the shortest time. Other finished steel products have a wider range of application, and some of their channels of consumption exhibit a more even flow than others. Wire nails, for instance, have fairly steady consumption in box making, while their use in building construction fluctuates widely. Tubular products used in the oil industry cannot remain long in light demand because oil wells are constantly showing decreased yields and there must be additional drilling and piping to maintain production. At the present time one sees a very fair volume of demand for oil country goods, the result of liquidation in the oil situation in the past few months, even though the rate of oil consumption has not come back to the highest level previously shown. The demand for sheets by Southern farmers showed a quick revival last August and September, the need having accumulated, while the cotton crop provided the buying power.

Liquidation in the supply of dwelling houses

occurred years ago, by demand exceeding supply, and houses long vacant secured occupants. The dwelling house building of the present time is surmounting the obstacle of high cost, because the liquidation has been so complete. There would be much more construction still if the cost were really reasonable.

In construction work of the larger kind liquidation takes more time, for the structures last longer. There have been periods in the past when a fair sized office building would be torn down to make room for a larger building, a 10-story structure, for instance, making way for a 20-story structure. The time is not yet ripe for such operations, but eventually it will be. Much the same is true of many bridges, which in time can be replaced advantageously by larger structures. The can of tomatoes lasts only until the contents are eaten, while bridges, buildings, freight cars, locomotives and other things last longer. Month by month the pressure for their replacement increases and eventually the reasons for deferring work are overcome by the reasons for taking it up.

Progress in Magnetic Testing

The magnetic testing of steel has already yielded definite results. Its disclosures as to the effect produced on rails by the gag press used in straightening them were discussed in an article in THE IRON AGE last week. It had been thought that magnetic testing would only reveal segregation, inclusions or lack of uniformity in certain sections of steel, but the researches of an important railroad have established the fact that other conditions can be detected. It has been known that the gag press strains certain points of the rail beyond the elastic limit of the steel. So delicate is the magnetic test that any section thus overstrained stands out prominently in the magnetic survey, but at the same time there is an entire absence of the evidence the test might give of lack of uniformity due to other causes. In other words, while information is obtained concerning gagging effects the results in other respects are entirely negative.

While this feature of magnetic testing is unfortunate in the one respect, it is advantageous in another, since it has resulted in vital improvements in the straightening process and in fewer rail failures. At the same time much light has been thrown on the problem of these failures in that it seems conclusively established that more failures are due to overstrained metal than to actual non-uniformity. This is in line, moreover, with the more recent results of fatigue researches.

Another interesting development is the experience of the Government in testing streamline wire used on airplanes. The magnetic test applied recently to a certain lot of wire showed, not a lack of uniformity in the wire, but a very slight deformation due to a minor irregularity in one of the rolls. The apparent non-uniformity of the wire was not shown by any ordinary tests nor was it a cause for condemning the wire. During the war a New York engineer perfected a magnetic device for testing the quality of welds in chain

making, using alternating instead of direct current, which rendered highly valuable service.

There are indications that the apparent disadvantages arising from the very sensitive nature of magnetic testing apparatus are in the way of being overcome. This may come about by modifications in the present apparatus or by the use of other devices jointly or separately. It is highly desirable that this method of testing which obviates the destruction of the metal itself should become a complete success.

Financing Foreign Trade

The Federal Reserve Board has compiled a statement showing the note circulation and metallic reserve of Belgium, France, Germany, Great Britain, Italy, The Netherlands, Canada and Japan at three times—at the end of 1904, ten years before the war started, in 1913, just before the war, and at the end of June, 1921. In thousands of dollars converted at par the circulation and metallic reserves are as follows, the ratio of reserves to notes being also given, for the eight countries taken together:

	Circulation	Reserves	Ratio
1904	\$2,180,096	\$1,402,858	64.4 per cent
1913	3,172,984	1,958,633	61.7 per cent
1921	35,885,319	3,080,806	8.6 per cent
	000 omitted		

Thus it is plain that the trouble about foreign currencies is not depletion of metallic reserve but increase in the circulation. From 1904 to 1913 is nine years and from 1913 to 1921 is eight years, but the metallic reserves while increasing only 40 per cent in the earlier period increased 58 per cent in the later period. The note circulation so increased, however, that the percentage of reserves dropped from above 60 to below 10.

These totals of course must not be considered typical of any country, for there are wide variations. Japan's metallic reserve increased from less than 10 per cent in 1904 to more than 100 per cent in 1921, and thus took part of the edge off the general showing. The Netherlands had a slight increase, and Canada had only a slight decrease. Then came Great Britain with a less favorable showing, the ratio in 1921 being about one-third what it was in 1904. France and Italy made still more unfavorable showings, while Germany has practically no showing at all, having had a reserve of 57.9 per cent in 1904, but only 1.3 per cent last June.

There is no prospect of material improvement in the foreign exchange situation except by overt acts. Exchange rates will not naturally return, and have been showing no disposition lately to return. Exports must be taken care of in some way or they cannot be made.

The net balance now due the United States on open account has been variously estimated, figures ranging from \$600,000,000 up to \$4,000,000,000. In its last review the Federal Reserve Board makes an extensive study of the subject, and finds that as nearly as it can estimate the various items the net unfunded balance due the United States as of Oct. 1, 1921, is about \$3,408,-

000,000. Account is taken of exports and imports, freights paid, tourists' expenditures, sale of securities, private investment of American capital abroad, and many other items. The amount is less than estimates that have been made of Europe's unfunded indebtedness to the United States, but that represents no discrepancy, as countries outside of Europe may have net credits.

The balance, whatever it may be, and whatever balance is allowed to pile up in future, must be taken care of. Payment cannot be made in gold to any extent. As to private investments of American capital abroad, the board's presentation sets this item, up to Oct. 1, 1921, at \$785,000,000, so that thus far operations under this means of settlement cannot be described as having been very brisk. Then there is the method of funding the indebtedness, but when three years have elapsed since the armistice it is evident that to be of avail the funding would have to be for very long periods. There remains the adjustment, which must occur if nothing else takes place, of exports being restricted and imports being encouraged. If an effort is made to discourage imports and nothing else is done, conditions will simply grow more pressing until the restrictions imposed are overridden. That is a fact that is not as generally appreciated as it should be. Gold can refuse to move, credits can be denied, American capital can exercise its prerogative and stay at home, currencies of foreign countries can go down as measured in gold and when all is said and done either merchandise will not move out of this country or foreign merchandise will come in. To do nothing but impose barriers to foreign merchandise is to foster the further disorganization and stress that would finally push the merchandise over the barriers. Much time has already been lost, for three years after the armistice there should not have piled up three billions or thereabouts of an unfunded balance due the United States in addition to the funded debt due the country.

As the fourth contribution to a series of papers on open-hearth practice before the American Iron and Steel Institute, to be possibly incorporated later in book form, the one on "Improvements in Port Construction," read at the recent New York meeting, discusses a subject of outstanding importance to the steel industry. The author traces the development of the earlier forms of ports and discusses the McKune, Venturi and Egler furnaces, citing the simple principle on which these are designed and pointing to some of the remarkable results from their use. It is always difficult to suppress surprise that, in this as in similar cases, so simple a principle was not hit upon earlier. Scientific regulation of the ingoing and outgoing gases, in this case the air in particular, has resulted already in more rapid heats, longer life to checkers, and lower stack temperatures, besides other gains. In one conspicuous case, cited by another authority, the life of the furnace as to heats was doubled and in others the output was increased at least 30 per cent. A production of 9500 to 10,000 tons of ingots per month from one 75-ton furnace is certain. On the testimony of

another writer, the Egler and McKune ports and similar devices "constitute the greatest advance in open-hearth practice since the adoption of the checkers and the principle of regeneration." Besides the advantages mentioned, there is also involved a decided elimination of waste in fuel and other materials, so important to economical production.

CORRESPONDENCE

New Car Wheel Specifications and Southern Charcoal Pig Iron

To the Editor: Under the above caption J. G. Henrick, in your issue of Aug. 25, discussed the tentative specifications for cast iron car wheels adopted by the American Society for Testing Materials at its annual meeting, as presented in THE IRON AGE of June 30 by H. J. Force. Mr. Henrick is entirely correct in his conclusions that these specifications are unjust and unfair to the Southern pig iron manufacturer.

It seems to the writer that the society in adopting these specifications, although but tentatively, has acted hurriedly in the premises without giving the matter the consideration that such an important subject deserved. Certainly the crippling of a necessary industry in any section of our country is not desired by right-thinking people anywhere. We of the South are grateful to Dr. Moldenke and others who endeavored to check this action, and we look to them to prevent these tentative specifications from becoming permanent. We note that in finally agreeing on 0.40 per cent as the maximum phosphorus content in the specifications this was done supposedly as a concession to the Southern manufacturers. As a matter of fact but few casts of charcoal iron made in the South run lower than this figure, the regular specifications for this element in Southern charcoal iron being approximately 0.40 to 0.60 per cent.

Mr. Force, recognizing the immediate need of improvement in the situation as to cast iron car wheels, has jumped to the conclusion that phosphorus is the cause of all its woes. He seemingly ignores the well-known facts concerning that element and, regardless of the effect of his conclusion on a large part of the industry, makes it the "goat." It has long been known that phosphorus in sufficient quantities will weaken cast iron. Most authorities agree that up to 0.75 per cent it has no appreciable effect on strength, and some assert that its good qualities overbalance its bad ones even up to 1 per cent. Tests made in our own laboratories show that our warm blast charcoal pig iron containing as high as 0.62 per cent phosphorus has a breaking strength of approximately 3500 lb. per sq. in., which is fairly representative of all Southern charcoal iron, and which will compare favorably with any charcoal iron having a lower percentage of phosphorus.

If, then, the failure of cast iron car wheels is not due to phosphorus, where can we look for the explanation? An inspection of tables No. 1 and No. 2 as presented by Mr. Force in his paper discloses facts that should be fairly conclusive when taken in connection with certain other facts bearing on the car wheel industry. In table No. 1 are listed six car wheels which were worn out in a service varying from five to eight years, and in table No. 2, 15 car wheels whose failure all caused serious derailments within a service, in the majority of cases, of from one to three years. In the first case we find that the sulphur averaged 0.142 per cent, with combined carbon 0.91 per cent, and in the second case the sulphur averaged 0.188 per cent, with combined carbon 1.12 per cent. Since the combined carbon in the resultant car wheel cannot be charged to the condition of carbon in the pig iron, but rather to operating and cooling conditions,

too much stress cannot properly be placed upon that element. However, the influence of sulphur on the carbon is so marked that it does not surprise us to note the lower combined carbon accompanying the lower sulphur in the good wheels and the higher carbon (combined) accompanying the higher sulphur in the bad ones. In spite of the fact that the sulphur in the wheels that failed averaged 0.188 per cent, we find Mr. Force recommending 0.17 per cent as a maximum for this element, and the society actually adopting 0.18 per cent as its tentative specification. It seems strange that in the face of chemical and metallurgical knowledge such action should have been taken. The explanation lies in the conditions existing in the car wheel industry itself.

Mr. Henrick has shown that from 1913 to 1919 one Southern company decreased its shipments of charcoal pig iron to wheel makers from 53 per cent to 16 per cent, and it can be shown that the percentage for the entire Southern trade has gone lower since that date. This fact does not tend to bear out the conclusion drawn by Mr. Force that the higher phosphorus content found in these irons is responsible for the largely increased failures of car wheels in recent years. Again, it can be shown that charcoal iron, of any sort, is fast disappearing from use in car wheel manufacture. As a matter of fact, there are now large railroads manufacturing their own car wheels and certain large car wheel manufacturing enterprises that do not use a pound of charcoal iron in their mixtures.

This condition is largely brought about by the M. C. B. rules in effect on the railroads of the country by which, when a failure of a car wheel occurs while on the tracks of a given railroad, it must be taken in by that road at a fixed price, and its own wheels failing in the service of another road must be sold to that road at the same fixed price. Given this rule and the further fact that certain car wheel manufacturers in the last ten years claim to make as good wheels out of coke pig iron as from charcoal pig iron, and the answer to the existing situation unfolds itself.

There is no denying the fact that sulphur in coke iron is greater than in charcoal iron. Since more than half of the mixture of metal used by most car wheel manufacturers enters in the form of scrap wheels, as the old car wheels, such as those shown in table No. 1 by Mr. Force, disappear, and those made without the use of the low sulphur charcoal irons increase, it is but a question of time until the society will have either to increase its sulphur specifications to accommodate the pyramiding of sulphur in the coke iron car wheels or else to reduce it to about 0.12 per cent, where it should be and again force the use of charcoal iron into the industry.

It can also be shown that the standard of physical tests of car wheels has been lowered in recent years, and Mr. Force is to be commended for calling attention to the necessity of making these more rigid. With this done, and the chemical specifications placed where manufacturers will be forced to use only the best materials obtainable instead of the cheapest, the whole situation will adjust itself and the appalling losses due to car wheel failures will be reduced to a minimum.

As the situation stands at present, no railroad can afford to pride itself upon the quality of its wheels, and in self defense must continue to use the cheapest instead of the best wheel it can make or purchase, only concerning itself to see that the wheels meet the present day standards of physical and chemical tests. It behooves, then, a great organization like the American Society for Testing Materials to take such steps to guard those standards as will result in better car wheels; and when this is done it is quite certain that phosphorus within reasonable limits will not be made the "goat," and a large section of our country will not be practically barred from the industry. Also the days when car wheels made from charcoal iron wore out instead of failing will return and there will be no necessity for the use of the electric furnace or of the rarer metals as alloys.

B. F. WILSON, JR.,

General superintendent, Bon Air Coal & Iron Corporation, Lyles, Tenn., Nov. 15, 1921.

MACHINING CRUISER SHAFTS

Extreme Accuracy Requires Special Precautions and the Most Careful Work

With the high speed of revolution and the great amount of power transmitted through the shafting of the new scout cruisers, now under construction for the United States Navy, the problem of balance at full speed has become one of considerable importance. Each cruiser has four shafts, designed to transmit approximately 23,000 hp. each, at 370 r.p.m. To obtain a rotating balance as well as a static balance, the Bethlehem Shipbuilding Corporation, in its Fore River plant, where the cruisers Raleigh and Detroit are being built, has adopted an interesting procedure described in the following paragraphs:

Each shaft, which is approximately 202 ft. long, is made up of four sections of line-shaft, varying from 25 to 32 ft., one stern tube shaft 42 ft. long and one propeller shaft 40 ft. long. All of this shafting has an outside diameter of about 14 $\frac{1}{2}$ in. and has a hole of 9 $\frac{1}{2}$ in. diameter bored the entire length. Flanged couplings are used between shafts, being forged solid with the shafting.

From the nature of the duty imposed upon this shafting, its extreme length, the flexibility of the hulls in which it is placed, due to limitations in depth of girder, the high revolutions of the machinery and propellers and the absolute necessity of avoiding vibration, it becomes apparent that ordinary lathe work, with its possible errors in balance, would not be sufficiently accurate to obtain the desired results. This came particularly to notice through previous experience on destroyers, which, while considerably smaller vessels, have much the same sort of problem in connection with power. Very slight errors in balance and alinement on destroyers were found to cause excessive vibration.

This shafting is made of a high grade navy specification nickel steel of a tensile strength of about 80,000 lb. per sq. in. The characteristics of this steel, its natural hysteresis and homogeneity, had to be studied during its turning and balancing. The word "hysteresis" deserves explanation.

On a long length of shafting, subjected to a torque applied at any starting point, and constantly varying both in quantity and location of application, it is found that peculiar distortions take place in the shaft, sometimes temporary and sometimes permanent in nature. These peculiar manifestations occur sometimes on shafts entirely of dissimilar materials, and are believed to be traceable to strains in the shafting, set up while it is being forged, and then released under the application of the peining hammer and the cutting effect of turning the shaft to final dimensions.

Stern Tube Shaft Characteristics

While the stern tube shaft, 42 ft. long, may be taken as typical in describing the procedure, it may be mentioned that added difficulties were experienced on this shaft, due to the fact that it is entirely cased with composition sleeves $\frac{3}{4}$ in. thick and about 15 in. in diameter. These sleeves, of course, have to be taken as a part of the shaft for the balancing and final turning operations. This section of shaft has no coupling forged on.

As received at the Fore River yard from the forging plant, the shafts have already been bored to the 9 $\frac{1}{2}$ in. internal diameter, and have been rough-turned to a diameter $\frac{3}{16}$ in. greater than the designed finish. The first operation upon the shaft is then to center it as accurately as possible upon the finished bore. On being placed in the lathe, the shafts are usually found to have an error of $\frac{1}{32}$ to $\frac{1}{16}$ in.

After spotting the error in one or two places, corresponding as nearly as possible to an equal division of the weight in relation to the length, a light cut is taken over the entire length of the shaft, until it runs truly. The shaft is then taken to the balancing blocks and carefully rolled to find out how much error in balance still exists, and where it is located. This error is found to run usually from 5 to 20 lb. and is considered due to lack of complete homogeneity in the steel.

Upon again being placed in the lathe, the shaft center is thrown over enough to compensate for the heavy side of the shaft. This is done more by a delicate sense of accuracy on the part of the operator than by any careful calculation, for it is found extremely difficult to calculate this error accurately and the operation becomes, therefore, one of trial and error. The shaft is then re-spotted and again turned in the lathe with a light cut over its entire length. This operation of centering, balancing, spotting and turning is repeated, usually some four or five times, before a balance is obtained which is regarded as satisfactory, and within the limits prescribed for the shaft.

From this point on the shaft is regarded as down to size and balance. There is, however, a minute error still existing, the amount and location of which are known and marked on the shaft. This information is used in lining up the shaft with the line shaft to which it is later connected at its forward end.

Allowing for the Composition Sleeves

It is assumed that the composition sleeves have all been turned and bored, ready for shrinking on. The manufacture of these sleeves has been carried on in a manner similar to that used for the shafting, with the object of arriving at a well balanced, homogeneous casting. In the shrinking on of these sleeves, great care must be exercised to avoid local overheating of the shaft, as, of course, a hollow shaft of this character would distort very easily.

After the sleeves are shrunk on, the shaft is brought back to the lathe to have the sleeves finished on the outside. It is usually found in this operation that there is an error in balance of anything up to 20 lb. in the total weight of some 16,000 lb. There is also found an error in trueness of the shaft, which may reach as much as $\frac{1}{32}$ in. It is thus obvious that under the new conditions, that is, the shaft and sleeve considered as a unit, this unit must go through the same alternate operations of spotting, centering, balancing and returning as has already been described for the shaft alone.

If the operation already outlined is followed with great care, the final error in the 42 ft. length of shafting can be brought as low as 0.002 in. out of true and a balance perfect to 1 oz.

Final operations on the shaft consists of keyway cutting, and drilling of flanges. The various lengths of shafts are then brought together for alinement. In this operation, the known errors in balance marked on each shaft are taken into consideration, and the shafting is so reamed and bolted together that the successive errors in successive lengths are made to cancel out through the circle of 360 deg., so that the final error in balance and alinement for the entire 202 ft. of length becomes negligible.

Some of the Requirements

To produce a high class job of this character, it is obvious that the first requirement is workmen of the highest skill; second, comes unrelenting carefulness and checking of results; close attention at all times to avoid not only the local overheating in shrinking on the sleeve, but also overheating in the lathe operations, and the utmost care in handling the shafting when it is suspended from overhead cranes.

To show the peculiar behavior of shafting of this class, it may be pointed out that, following a day's turning in the lathe, the shafting would be slightly warm and would show a noticeable error. On cooling off over night, however, this error has been found to disappear. The best results have been obtained with a flat tool, as the strain imposed by a roughing tool is sufficient to throw the shaft out of true, due to the peining effect of such a tool.

The American Metal Parts Co., 1916 St. Paul Avenue, Milwaukee, manufacturer of machinery and automotive materials, has increased its capital stock from \$100,000 to \$200,000. H. A. Sherff is president and general manager.

Thorough Investigation of Steel Prices

Interstate Commerce Commission Will Also Inquire
as to How Costs Compare with Those of Last
August—Reasonableness of Rates to Be Determined

WASHINGTON, Nov. 29.—That the Interstate Commerce Commission is going thoroughly into prices of steel being paid at present by railroads as compared with those in effect Aug. 31, 1920, was made plain to-day. The Commission, in a formal announcement of procedure to be pursued at the general investigation beginning Dec. 14 regarding reasonableness of rates specifically states 10 subjects which it suggests should be presented. A part of one of these is an inquiry as to how contracts and costs for rails, ties, other materials and supplies, locomotives, cars and fuel now current compare with those in effect on the last day of August, 1920. It is requested that figures be given and also to make known when the contracts expire and to what extent contract prices are conditioned on wage scales. Information as to what part of the cost of each of these materials and equipment is for transportation is asked.

Proceedings are to begin with the submission of evidence by railroads, with the opportunity for arguments at the close of the hearing when questions of law may be discussed. During the period Dec. 14 to 21 respondents are expected to put in their case. The hearing is to be resumed Jan. 9 for the shippers' side, which will be arranged according to commodities, etc., when steel manufacturers, among others, are expected to present their views regarding rates and related

matters, answering one of the Commission's queries as to whether present rates are reasonable for specified commodities and, if not, to what extent they are unreasonable. Other matters relate to financial returns for railroads, to what extent operating expenses have been reduced since Aug. 31, last year, by furlough or discharge of employees, reduction of wages, changes in working conditions and by reductions in operating expenses.

The extent to which rates have been further increased and reduced since the general increase last year, changes in volume of traffic and suggestions as to what readjustments have not been but should be effected will be gone into thoroughly. Inquiry also will be made as to what extent, if any, maintenance of road and equipment has been curtailed since Aug. 31, last year, and as to present condition of road and equipment, together with amounts expended for additions and betterments. Another important question is in case rates are found unreasonable in the aggregate or in rate groups, should general reduction in all rates be required or reduction be required in rates on specified commodities or description of traffic. In case rates are found to be reasonable in the aggregate but unreasonable on specified commodities, the commission wants to know what readjustment should be required.

Plans of Congressional Committee Investigation

WASHINGTON, Nov. 29.—Selected as spokesman for the iron and steel industry, President James A. Campbell, Youngstown Sheet & Tube Co., to-day was appointed on one of 44 committees of shippers chosen by the joint Congressional Committee on Agricultural Inquiry for the purpose of securing data on marketing and transportation facilities. The joint committee is headed by Representative Sidney Anderson of Minnesota. The 44 committees are appointed in conjunction with the executive traffic committee of the railroads. F. E. Todd, vice-president Deere & Co., Moline, Ill., has been named to represent the agricultural implement industry. The committee is to complete its work by Jan. 1; when the evidence will be reviewed and analyzed by an advisory committee of 12 members, the personnel of which is to be announced later. Interest in the inquiry is heightened by reason of the general investigation as to reasonableness of rates ordered by the Interstate Commerce Commission and the opinion prevails that the purpose of the Congressional committee is to provide ground work for legislative work bearing on transportation costs and railroad earnings.

Chairman Anderson to-day said to THE IRON AGE representative: "Every phase of distribution is being investigated in relation to transportation. This investigation involves physical property, transportation service, the economic relation of transportation to agriculture and industry, and the administration of transportation, with an analysis of State and Federal laws applying to transportation. A study is being made of the relation of car service and supply and the successful distribution of products, with particular reference to the condition of equipment. It can be conservatively stated that 15 per cent of the equipment of the railroads is in poor condition."

The purpose of this inquiry, which was authorized by a special act of Congress last spring, is to apply four standard tests in an effort to measure the well-being of agriculture as compared with other industries. The inquiry will take in the purchasing power of the farmer's dollar; the absolute price of agricultural products as compared with prices of other commodities; quantity production of agriculture as compared with quantity production of other industries; and the rewards for capital invested and labor employed in agriculture as compared with the rewards for capital invested and labor employed in other industries.

It is significant that the commission has found that little evidence of an unreasonable spread exists between producers' and consumers' prices. In a statement to-day, Chairman Sidney Anderson said: "The costs of distribution were increasing slowly but steadily over those prior to 1913. So far as we can ascertain, they have about doubled since 1913, and to-day the costs of distribution represent about one-half of the prices which the final consumer pays. These increases in costs do not occur in any one place in the line of distribution. They occur as a part of the price of every element of service performed in connection with the distribution of the product all along the line. This means that the spread between the producer's and consumer's prices must, for the most part, be reduced by more efficient methods of distribution, by reducing unnecessary transportation hauls. By more efficient merchandising methods, by more closely relating output to market, by speeding up turnover, by reducing unnecessary stocks, and otherwise shortening and speeding up the steps between the producer and the consumer."

Iron and Steel Markets

YEAR-END QUIETNESS

Oil Lines and Railroads the Chief Sources of Orders

Welsh Get Canadian Tin Plate Order—40,000 Tons of Rails for Argentina

Oil company buying and further announcements of railroad requirements in rails and cars that may develop shortly into contracts have been the chief features of the week. It now comes out more definitely that the coming Commerce Commission hearings at Washington will take up the relation of steel prices and railroad buying to the agitation of iron and steel makers for lower freight rates. Meanwhile, railroads are deliberating over their rail tonnages for 1922. Orders may come about the first of the year for 300,000 tons or more.

In the Chicago district orders from builders who took recent car business came in time to prevent some curtailment of mill operations. About 30,000 tons has been placed in the past fortnight.

The activity in line pipe for oil fields is due largely to the fact that makers have been willing to accept low and unprofitable prices to secure orders. The Pure Oil Co. has contracted for a 250-mile line of 8-in. pipe amounting to 17,000 tons. Another contract for 13,000 tons of various sizes is expected to be closed this week. One oil company has increased a recent pipe inquiry to 20,000 tons and in addition is considering 10,000 tons of plates for tank work.

Seasonal influences are more evident in the heavier steel lines, particularly plates and structural shapes, which are quiet. Under present market conditions, tank shops are bidding on work without first getting prices on the steel. In structural work a 3100-ton contract for subway extension in New York and 2600 tons taken at Pittsburgh for power transmission towers in the South are the chief items.

Mill operations are fairly well maintained. In a few instances a special effort has been made to give more men employment against the holidays. The average for the industry is probably 40 to 45 per cent.

There is no new development in prices. On smaller lots of plates, shapes and bars 1.60c. is commonly the basis, and as heretofore larger business is done at 1.50c. In the wire trade, while there are \$2.90 nail contracts on the books and plain wire contracts at \$2.60, deliveries are made at \$2.75 for nails and \$2.50 for wire under extensions of the prices prevailing before Sept. 12.

The American Sheet & Tin Plate Co. opened its books on Nov. 23 for 1922 business at 3c. for black, 4c. for galvanized and 2.25c. for blue annealed sheets. Independent companies are nam-

ing these prices also, but the present inactive market has not seriously tested them.

Winter operation of tin plate mills promises to be on a good scale, in view of the thorough cleaning out of stocks. Welsh makers of tin plate, with 40 shillings ocean freight to Vancouver, took 150,000 boxes there lately at close to \$5.25 per box, duty paid. This is well below any American competition. On recent Pacific Coast contracts, Baltimore makers, with an all-water haul, have been able to underbid Pittsburgh.

Bids on forty thousand tons of rails for the Argentine are to be opened this week. German and Belgian mills have \$6 per ton advantage on freight, but the requisite financing may not be easy for European mills.

Very little activity is reported in the pig iron market, the principal inquiries being for 7000 tons of basic for a Harrisburg company and 4000 tons of basic for a company at Portsmouth, Ohio. The Pennsylvania Railroad is in the market for about 2000 tons of foundry iron. Some concessions are being made in the Philadelphia and Chicago markets and the \$17.50 quotation on Southern iron is more freely named, although \$18 is still the general asking price.

The 1921 movement of iron ore by vessel from Lake Superior ended this week with a total of 22,300,726 gross tons, the smallest since 1904. From 1920 the falling off was 36,226,500 tons, or 62 per cent. The record year was 1916, when 64,734,000 tons came down the lakes.

Lake Superior mining operations promise little for the coming winter, though at some Gogebic properties three days work a week instead of two has been given recently. At a few mines of independent companies mining wages are back to the 1914 level.

Pittsburgh

PITTSBURGH, Nov. 29.

General conditions in the iron and steel market show little change from those of a week ago. Outside of pipe, business in steel products still is on a tapering scale, and while this condition as yet has not seriously disturbed the operation of the various Steel Corporation subsidiaries, it is finding reflection in the activities of most of the independents. The Carnegie Steel Co. has about 55 per cent of its open-hearth furnaces in operation, and since these are at plants where the units are of large capacity, its ingot output is even larger than is indicated by the numerical percentage. This company still has 25 of its 59 blast furnaces in blast. The American Sheet & Tin Plate Co. last week averaged over 77 per cent of its hot mill capacity and this week's schedule calls for the operation of about 80 per cent. This schedule may not be attained, however, because the flooded condition of the rivers, resulting from several days' steady rain, will mean the loss of about two days' operation at the Wood works of the company at McKeesport, Pa. The National Tube Co. and the American Steel & Wire Co. are running higher than 50 per cent in this district. We estimate independent steel

Ferroalloys.—Activity still is lacking and in the absence of important sales, it is impossible to make any change in quotations. The Carnegie Steel Co. is an occasional seller of ferromanganese, but in connection with the few tonnages it has sold, it is stated that they were entirely for the accommodation of other companies which had contracted for tonnages, but were not getting shipments promptly enough to meet needs. The company disclaims having entered the market in a commercial way. Some of the sales were to companies which had a contract for German material. It is evident German makers are not living up to their obligations and lately material from that country has not been conspicuous in the offerings. Regular domestic makers of ferromanganese all are quoting \$58.35 seaboard, for 80 per cent material, and that also is the quotation of English producers. The Edgewater Steel Co. is in the market for a carload of this material. Almost nothing is being done in spiegeleisen or in 50 per cent ferrosilicon.

We quote 78 to 82 per cent domestic ferromanganese at \$60 to \$63.67 delivered; 78 to 82 per cent foreign ferromanganese, \$58.35, c.i.f. Atlantic seaboard. We quote average 20 per cent spiegeleisen at \$30 delivered, Pittsburgh or Valley; 50 per cent ferrosilicon, domestic, \$55 to \$57, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, \$38.50; 11 per cent, \$41.80; 12 per cent, \$45.10; 13 per cent, \$49.10; 14 per cent, \$54.10; silvery iron, 6 per cent, \$27; 7 per cent, \$28; 8 per cent, \$29.50; 9 per cent, \$31.50; 10 per cent, \$33.50; 11 per cent, \$36; 12 per cent, \$38.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$4.06 per gross ton.

Billets, Sheet Bars and Slabs.—The market is inactive but fairly steady at recent prices. Sheet makers who buy their bars are not well enough off in the matter of orders to be much interested in the market at the moment, and the tin plate companies which have the biggest bookings, either make their own tin bars or are covered by contract. There is no pressure to sell sheet bars for the reason that most companies which produce this form of steel in a commercial way also make the finished products and naturally are not inclined to increase the competition on the finished lines by cutting prices on the sheet bars. This also is applicable to billets and slabs. With merchant bars and plates available at 1.50c., there is no good reason why buyers should buy semi-finished material at current prices, and on the other hand, no reason why producers should cut prices on billets and slabs since to do so would mean the shading of 1.50c. on the finished products, a price which is generally considered to be too low.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at \$28 to \$30; 2 x 2-in. billets, \$30; Bessemer and open-hearth sheet bars, \$30; slabs, \$30; forging billets, ordinary carbons, \$32 to \$35, all f.o.b. Youngstown or Pittsburgh mills.

Wire Rods.—There is no increase in demand and so little is going on that prices are indefinite. Makers generally are quoting \$40 for the base size of soft rods, but would give consideration to firm offers of less. Prices are given on page 1446.

Steel Skelp.—We note no material increase in the demand, despite the fact that business in most lines of tubular goods is comparatively good, and prices are rather weak. Quotations still range from 1.60c. to 1.65c., but with plates available as low as 1.50c. it is believed that figure would be done on attractive skelp orders.

Wire Products.—Current demands reflect the proximity of the end of the year. Both jobbers and manufacturers are buying close to actual requirements to avoid too much of an inventory at the end of the year. Some makers have entered contracts for nails at \$2.90 base, per keg, but such business, except in a few instances, has carried with it definite shipping instructions and is regarded as protection to buyers who are likely to provide shipping directions only in the event of an advance in prices. Little of the tonnage now moving is priced at higher than \$2.75 per keg and the going market on plain wire is \$2.50, although this price is not openly quoted except to manufacturers on 90-day contracts.

We quote wire nails at \$2.75 to \$2.90 base per keg, Pittsburgh, and bright basic and Bessemer wire at \$2.50 to \$2.60 base per 100 lb., Pittsburgh.

Plates.—There is no appreciable increase in the demand nor any material change in prices. The general asking quotation is 1.60c., but competition for passing orders is too sharp to allow makers to secure business, even in small lots, higher than 1.50c.

We quote sheared plates, 3/4 in. and heavier, tank quality, at 1.50c. to 1.60c. f.o.b. Pittsburgh.

Steel Rails.—Little business is coming out in light rails at present and competition for the few orders which are developing is so keen that prices largely favor buyers. On single carload lots makers are able to obtain 1.60c. base, and occasionally 1.65c., but on lots of more than a carload, the common price is 1.55c., these prices for rails rolled from new steel.

We quote 25 to 45-lb. sections, rolled from new steel, 1.55c. to 1.65c. base; rolled from old rails, 1.50c. to 1.55c. base; standard rails, \$40 per gross ton mill for Bessemer and open-hearth sections.

Iron and Steel Bars.—There is no special change in the situation with regard to the demand, but prices are a shade easier in that comparatively small tonnages now are being accepted at 1.50c., base, or close to that price. Demand for iron bars is purely hand-to-mouth, with makers trying to maintain a base of 2.25c., but not letting orders slip away at less.

We quote steel bars rolled from billets at 1.50c. to 1.60c.; reinforcing bars, rolled from billets, 1.50c. to 1.60c. base; reinforcing bars, rolled from old rails, 1.45c. to 1.50c.; refined iron bars, 2c. to 2.10c. in carloads, f.o.b. mill, Pittsburgh.

Structural Material.—The market this week is even quieter than it has been recently, only one of the larger fabricating interests reporting any awards. It is getting pretty late for erecting and prospective builders feel they have nothing to lose by deferring their work. The Riter-Conley Co. has taken 1100 70-ft. transmission towers for a Southern power company for which about 2600 tons of steel will be required. Plain material is slow, with prices varying in keeping with the quantity sought. Prices are given on page 1446.

Iron and Steel Pipe.—Business in steel pipe is fairly satisfactory to manufacturers from the standpoint of volume, but not from the viewpoint of prices, which are kept down to unprofitable levels by the sharpness of competition. Particularly is this true of line pipe, which is selling at prices way below those for other kinds of goods, the difference between merchant pipe and line pipe being a matter of more than \$25 per ton. The low prices on line pipe, however, are attracting orders. The Pure Oil Co., last Saturday, placed the order for about 225 miles of 8-in. line pipe for its Humphries field subsidiary, the business being divided between a Youngstown and a Middle Western maker. Slightly more than 17,000 tons are involved in this transaction. The Sinclair Oil Co. is expected to close shortly for 90 miles of 10-in. pipe, 60 miles of 8-in. and 20 miles each of 4-in., 3-in. and 2-in., this being equivalent to about 13,000 tons. A Pittsburgh company with wells in West Virginia recently placed with a Youngstown mill a total of 33 miles, or 700 tons, of 2-in., 3-in., 4-in., and 6-in. pipe. An Eastern oil company is a prospective buyer of 7500 tons of line pipe in the near future. The Midwest Refining Co. is in the market for a fair sized tonnage of oil well pipe and not line pipe, as reported a week ago. Makers of wrought iron pipe report a fairly well sustained demand for standard pipe, but not much activity in oil country goods. Discounts are given on page 1446.

Sheets.—The American Sheet & Tin Plate Co. opened its books on Nov. 23 for first quarter and first half business at 3c. for black, 4c. for galvanized, and 2.25c. for blue annealed. Independent companies also are quoting these prices and are adhering to them firmly. There is so little demand, however, for either prompt or future shipments, that the market is largely untested. Prices are given on page 1446.

Tin Plate.—There is a fair run of business calling for early delivery and the mills also are fairly successful in lining up business for first quarter and first half of 1922 delivery. Indications still point to considerable activity for the mills in the early part of next year, but it cannot be said that observance of the price of \$4.75 per base box is as rigid as it was expected to be.

Some shading of this price is reported on the Pacific Coast, and on export business that quotation effectually bars out domestic producers because it is more than \$1 a box above what Welsh makers recently have done.

We quote standard production coke tin plate at \$4.75 per base box f.o.b. Pittsburgh for carload lots.

Cold-Finished Steel Bars and Shafting.—Orders are a little more frequent than they were a short time ago, but individually and collectively they are small. The general asking price on cold-finished screw stock and shafting is 2.15c. base, but on lots that aggregate more than a carload the price ranges down to as low as 2c. The recent rise in the price of oil has stimulated the demand for steel drills, one maker here having recently shipped three carloads. Ground shafting is unchanged at 2.75c., base, mill.

Hoops and Bands.—Trading still is limited and prices are irregular and easy. Hoops range from 2.10c. to 2.25c., and bands from 2c. to 2.25c. Most of the business is at the inside figures

Hot-Rolled and Cold-Rolled Strips.—Consumers are specifying fairly well on old orders carrying a base of 2c. for hot-rolled and 3.75c. for cold-rolled. Not much new business is developing.

Nuts, Bolts and Rivets.—Demand for bolts and nuts still is small, with buyers disinclined to take on more than actual requirements. Quotations are more of an asking than a selling basis. Rivet manufacturers are making a strong effort to maintain a price of \$2.40 for large structural rivets and \$2.50 for large boiler rivets, and those making a complete range of sizes disclaim having accepted business at less. Prices and discounts are given on page 1446.

Coke and Coal.—Beehive oven coke operators without regular consuming connections are finding it almost impossible to dispose of their product these days, because there is so little demand. Furnace grade offered by such producers lately has sold down as low as \$2.75 per net ton, ovens, and \$3 has become not only the maximum, but also an extreme price. Business in 48-hr. coke for future shipment also is slack, although we note one contract for 7500 tons per month for four months, starting Dec. 1, from an Eastern furnace. It is reported that this business was placed at \$3.40 per net ton, oven. Foundry coke also is slow, with good grades available as low as \$4, and \$4.50 the top on choicest brands. The coal market is absolutely stagnant and sales are difficult even at very low prices. Good steam coal, mine run grade, can be bought at \$1.50 per net ton, at mines, by-product coal at \$1.75, and gas coal \$2.25.

Spikes.—Some demand is coming out for small spikes, but the railroads seem to have covered their immediate requirements of standard spikes and activity is lacking in that quarter. Few makers have any considerable backlog of business and competition for passing orders is sharp and prices are easy. On standard spikes, \$2.25 base per 100-lb. and on small spikes \$2.40 base for 100-lb. rarely are exceeded. Prices are given on page 1446.

Old Material.—The market remains dull and weak, and prices have been further reduced on such grades as turnings, and borings, offerings of which exceed the demand. Only one or two steel companies in this district are buying scrap at present, and even they will not go very high to get tonnages, as they are fairly well stocked while their orders for finished steel are decreasing. Dealers, having completed most of their contracts, are not in the market except for such tonnages as can be picked up at bargain prices. Prices on rerolled reinforcing bars and light rails rolled from old standard sections are so low and unprofitable that makers of these products have practically withdrawn from the market for rerolling rails. The foundries are sparing buyers of old material. The Pennsylvania Railroad, eastern region, list for December, offers approximately 20,000 net tons of scrap, including 8000 tons of No. 1 rails and 2000 tons of scrap rails. The Baltimore & Ohio Railroad will take bids until noon, Dec. 5, on 17 cars and 10,255 gross tons of old material; also for 3000 lb. of high speed steel. The

Dodge Bros. list, which closed yesterday, offered 500 tons of turnings, 300 tons of borings, 250 tons of compressed sheets, and 150 tons of shoveling steel.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh.....	\$14.00 to \$14.50
No. 1 cast, cupola size.....	16.50 to 17.00
Rerolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.	16.00 to 16.50
Compressed sheet steel.....	11.50 to 12.00
Bundled sheet sides and ends, f.o.b. consumers' mills, Pittsburgh dist..	10.50 to 11.00
Railroad knuckles and couplers.....	14.50 to 15.00
Railroad coil and leaf springs.....	14.50 to 15.00
Low phosphorus standard bloom and billet ends	20.00 to 21.00
Low phosphorus plates and other grades	17.00 to 17.50
Railroad malleable	13.00 to 13.50
Iron car axles.....	26.00 to 27.00
Locomotive axles, steel.....	24.00 to 25.00
Steel car axles.....	16.00 to 16.50
Cast iron wheels.....	15.50 to 16.00
Rolled steel wheels.....	14.50 to 15.00
Machine shop turnings.....	9.50 to 9.75
Sheet bar crop ends.....	14.00 to 14.50
Heavy steel axle turnings.....	11.50 to 12.00
Short shoveling turnings.....	10.25 to 10.75
Heavy breakable cast.....	14.50 to 15.00
Stove plate	13.00 to 13.50
Cast iron borings.....	10.00 to 10.25
No. 1 railroad wrought.....	11.50 to 12.00

Employment in St. Louis

ST. LOUIS, Nov. 29.—Replies received from questionnaires addressed by the Eighth Federal Reserve Bank to 210 leading employers in 21 of the largest cities in the district with an estimated normal complement of 203,219 workers, asking for employment data, developed in the following results:

Date		Number of Wage Earners	Pay Roll
Oct. 1, 1920	Men	186,890	
	Women	20,843	
	Total	207,733	\$17,834,620.38
Oct. 1, 1921	Men	148,492	
	Women	18,753	
	Total	167,245	\$12,572,533.54

From the above tabulation it will be noted that the number of employees of the reporting interests decreased 40,488, or 19.5 per cent, between the dates Oct. 1, 1920, and October 1, 1921. On Oct. 1, 1920, the number was 4514 or 2.2 per cent above normal, and on Oct. 1, 1921, the total was 35,974, or 17.7 per cent under normal. Wages figured on a semi-monthly basis decreased \$5,262,086.54, or 29.5 per cent between Oct. 1, 1920, and Oct. 1, 1921. On July 1, 1921, the total number of wage earners was 27.4 per cent under normal and on Aug. 1, 1921, 23.1 per cent under normal.

High Water Closes Steel Plants

PITTSBURGH, Nov. 29.—The Wood works, McKeesport, Pa., of the American Sheet & Tin Plate Co. was obliged to suspend operations at midnight Nov. 28 owing to high water and at the National works of the National Tube Co., McKeesport, the inflow of water forced the suspension of its plate mills. The crest of the flood was reached here this afternoon about 3 o'clock and barring further rain the rivers are expected to subside sufficiently to enable the mills forced down to resume. None of the plants of Carnegie Steel Co. was affected but it is feared that the Mingo plant near Steubenville, Ohio, which recently started up, may be forced down temporarily by the flood condition. Not much steel works capacity is active in Wheeling and consequently the swelling of the rivers will have little effect upon operations.

Large Order for Pipe

YOUNGSTOWN, OHIO, Nov. 29.—The Youngstown Sheet & Tube Co. has secured a 250-mile 8-in. pipe line order from the Pure Oil Co. The order will engage the company's pipe mill capacity and additional skelp mills for about six weeks. It involves 17,000 tons.

Chicago

CHICAGO, Nov. 29.

Current buying is confined largely to immediate requirements, reflecting the desire of consumers to keep their stores down to a minimum as the time for taking inventory approaches. With new bookings generally light, orders for steel from car builders promise to prevent a curtailment of mill operations. Late reports indicate that the steel required for the refrigerator cars ordered by the Santa Fe amounting to 17,000 tons has been placed with a local producer. This tonnage, added to that ordered last week for the St. Paul cars makes a total of 30,000 tons placed within a fortnight. Rail orders for 1922 are also expected to be placed about the first of the year, as a number of Western roads are preparing to issue inquiries for their requirements.

The price situation shows little change, the only evidence of greater firmness to be noted being in sheets. Pig iron seems to have settled definitely to a \$20 level, notwithstanding the appearance of more inquiry.

Mill operations are holding their own and pig iron production is increasing. The Illinois Steel Co. started the week with about 45 per cent of its ingot capacity active and the Inland Steel Co. is on about the same basis. The former company has added one more active furnace, a banked stack at Gary having resumed production. This producer now has 11 furnaces in blast, six at Gary, four at South Works and one at Joliet. This week the leading maker of merchant pig iron will start warming a furnace at Mayville with the probability that the first cast will be obtained about the middle of December. It expects to light a Federal stack in January.

Pig Iron.—With a Mayville furnace going in this week and a Federal stack scheduled to be put in in January, it is apparent that pig iron consumption has overtaken production. At the same time, prices are on a lower level than they have been for some time. On all except carload lots, which are still moving at \$21 base local furnace, the market appears to range from \$20 to \$20.50 base. Some small tonnages for first quarter shipment have been placed at these prices and a number of inquiries for 1922 delivery are before the trade. A Wisconsin machinery maker wants 1000 tons of foundry for first half delivery and another melter in the same State is inquiring for 500 tons of foundry for shipment during the same period. The St. Paul Railroad is inquiring for 500 tons of malleable for prompt delivery. The Rundle Mfg. Co., Milwaukee, Wis., which has been inquiring for 1700 tons of Southern foundry for first quarter shipment, is expected to close this week. As low as \$17.50, base Birmingham, has been quoted. Low phosphorus is now available at \$38 delivered, or slightly under \$33, Valley furnace. A recent sale of 500 tons of silvery indicates a drop of \$2 in the market. All makers of charcoal are now quoting \$28, base furnace.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b., furnace other than local.

Lake Superior charcoal, averaging sil.	
1.50, delivered at Chicago.....	\$31.50
Northern coke, No. 1, sil. 2.25 to 2.75	20.50 to 21.50
Northern coke, foundry, No. 2, sil.	
1.75 to 2.25.....	20.00 to 21.00
Northern high phos.....	20.00 to 21.00
Southern foundry, sil. 1.75 to 2.25.....	24.17 to 24.67
Malleable, not over 2.25 sil.....	20.00 to 21.00
Basic	21.00
Low phos., Birmingham.....	32.00
Low phos., Valley furnace, sil. 1 to 2	
per cent copper free.....	33.00
Silvery, sil. 8 per cent.....	32.02

Ferroalloys.—A steel foundry is inquiring for 300 tons of 15 per cent ferrosilicon for shipment over the next three months. Spiegeleisen is now available at \$30.50 to \$32.50, delivered.

We quote 78 to 82 per cent ferromanganese, \$66.75, delivered; 50 per cent ferrosilicon, \$60, delivered; spiegeleisen, 18 to 22 per cent, \$30.50 to \$32.50 delivered.

Railroad Equipment.—The Bettendorf Co. has

bought 4000 axles at a reported price of slightly under 2c., base Pittsburgh. Few new car inquiries have appeared. The Great Northern is in the market for 500 gondola cars and 35 passenger cars, in addition to the 1000 box and 500 refrigerator cars noted in this column last week. The Chicago & Alton has let repairs on 150 gondola cars to the Streets Co., Chicago.

Bolts and Nuts.—Demand is light and discounts are still unsteady, although no weaker than they have been. There continues to be some railroad buying, confined largely to carload lots.

The Burlington and the Chicago & Northwestern are both in the market for a carload of machine and carriage bolts and lag screws. Some orders are being placed by car builders who recently received contracts for cars from the railroads. For mill prices, see finished iron and steel, f. o. b. Pittsburgh, page 1446.

Jobbers quote structural rivets, 3.43c.; boiler rivets, 3.53c.; machine bolts up to 3/4 x 4 in., 60, 10 and 10 per cent off; larger sizes, 60 and 10 off; carriage bolts up to 3/4 x 6 in., 60 and 10 off; larger sizes, 55 and 5 off; hot pressed nuts, square and hexagon tapped, \$3.75 off; blank nuts, \$4.00 off; coach or lag screws, gimlet points, square heads, 65 and 5 per cent off. Quantity extras are unchanged.

Structural Material.—Fabricating awards are fewer and while several large projects are pending, construction activity appears to be declining as colder weather approaches. The Meridian Highway Bridge Co. will take bids this week on a highway and railroad bridge at Yankton, S. D., involving 3700 tons. Bids will also be taken this week on viaduct work for the Chicago Union Station, requiring 3600 tons, and on the J. L. Taylor Co. building, Chicago, calling for 1000 tons. Plain material prices range from 1.60c. to 1.75c., Chicago. Fabricating awards include:

Marquette University, Milwaukee, Dentistry Building, 115 tons, to Lakeside Bridge & Steel Co.

Evanston, Ill., Street Railway Co. trestle, 75 tons, to Milwaukee Structural Steel Co.

Pending business includes:

Eighth Street Bascule Bridge, Sheboygan, Wis., 650 tons, Wisconsin Bridge & Iron Co., low bidder.

Haskell & Barker Car Co., foundry and paint shop, Michigan City, Ind., 900 tons, bids in.

Elks' clubhouse, Milwaukee, estimated cost \$1,000,000; structural and reinforcing bar tonnage details not yet worked out.

St. Louis Federal Reserve Bank, 2000 tons, figures to be asked soon.

The mill quotation on plain material ranges from 1.60c. to 1.75c., Chicago. Jobbers quote 2.78c. for materials out of warehouse.

Bars.—Demand for mild steel bars remains light and prices appear to be at the same level as a week ago. Activity in the reinforcing field is still subnormal, but a number of large projects calling for bar tonnage are in sight. A tuberculosis sanatorium for service men to be erected at the National Home for Disabled Volunteer Soldiers, Milwaukee, will require from 750 to 1000 tons. Bids will close Dec. 19 at the office of C. W. Wadsworth, general treasurer, Dayton, Ohio. The taking of bids on the Grant Park Stadium, Chicago, has been postponed until Dec. 12. This project will involve 2580 tons of bars and 160 tons of spirals. A million-dollar Elks' Club house in Milwaukee on which bids will probably be taken early next year, is expected to require a large tonnage of reinforcing steel. The general contract for bridges at Little Rock, Ark., requiring 1700 tons, was awarded to the Missouri Valley Bridge & Iron Co., instead of the Koss Construction Co., as reported last week. The steel was sublet in the East. The Corrugated Bar Co. will furnish 400 tons for a filtration plant, Grand Rapids, Mich., and 150 tons for the water department, St. Paul, Minn. New business in bar iron and rail carbon steel bars is light and the price situation remains unchanged.

Mill prices are: Mild steel bars, 1.60c. to 1.75c., Chicago; common bar iron, 1.65c., Chicago; rail carbon, 1.65c., mill or Chicago.

Jobbers quote 2.68c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.55c. for rounds and 4.05c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 2.38c. base. Hoops and bands, 3.28c.

Cast-Iron Pipe.—The approach of severe weather has tended to curtail demand for pipe. Only two new inquiries are reported. Hamtramck, Mich., will take bids today on 2600 ft. of 16-in. and specials and the Detroit Board of Fire Commissioners took figures yesterday on 70 tons, principally 6-in. Springfield, Ohio, which recently rejected bids on 900 tons, will take new figures on Dec. 5. Mt. Healthy, Ohio, awarded 70 tons to the United States Cast Iron Pipe & Foundry Co.

We quote per net ton, f.o.b. Chicago, ex-war tax, as follows: Water pipe, 4-in., \$47.10 to \$48.10; 6-in. and above, \$43.10 to \$44.10; class A and gas pipe, \$4 extra.

Rails and Tracks Supplies.—No new rail inquiries have made their appearance, but several are expected to be put out soon. The St. Louis Southwestern contemplates entering the market for 10,000 tons for 1922 requirements and the Kansas City Southern is also preparing to cover its needs. Spikes and bolts and tie plates are still weak, but the appended quotations still represent the ruling market.

Standard Bessemer and open-hearth rails, \$40; light rails rolled from new steel, 1.70c. to 1.75c. f.o.b. makers' mills. Standard railroad spikes, 2.20c. to 2.25c., Pittsburgh; track bolts with square nuts, 3.20c. to 3.25c., Pittsburgh; tie plates, steel and iron, 2c., f.o.b. mill; angle bars, 2.40c., f.o.b. mill.

Sheets.—Mills are holding firmly to 2.25c. base, Pittsburgh on blue annealed, 3c. on black and 4c. on galvanized. Although new business is lighter, no doubt because buyers are not yet convinced that the new quotations are stable, mill books are comfortably filled. The local independent is operating full and expects to continue at that rate throughout the remainder of the year.

Mill quotations are 3c. for No. 28 black, 2.25c. for No. 10 blue annealed and 4c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight to Chicago of 38c. per 100 lb. Jobbers quote: Chicago delivery out of stocks, No. 10 blue annealed, 3.38c.; No. 28 black, 4.15c.; No. 28 galvanized, 5.15c.

Old Material.—With consumptive buying even smaller than heretofore, selling prices have generally weakened. Among recent purchases by users indicating the downward trend of the market may be mentioned 700 tons of No. 1 busheling bought at \$9.50 per net ton delivered, 1500 tons of No. 1 wrought covered at \$12 per net ton, and 400 tons of iron axles taken at \$20.50 per net ton. Railroad offerings include the Burlington, 7400 tons; the Santa Fé, 3000 tons; the Baltimore & Ohio, 11,000 tons; the Lake Erie & Western, 400 tons, and the New York Central, a blind list.

We quote delivery in consumers' yards Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton		
Iron rails	.....	\$17.00 to \$17.50
Relaying rails	.....	25.00 to 30.00
Cast iron car wheels	.....	16.50 to 17.00
Rolled or forged steel car wheels	.....	14.50 to 15.00
Steel rails, rerolling	.....	14.00 to 14.50
Steel rails, less than 3 ft.	.....	13.50 to 14.00
Heavy melting steel	.....	12.00 to 12.50
Frogs, switches and guards cut apart	.....	12.00 to 12.50
Shoveling steel	.....	11.50 to 12.00
Low phos. heavy melting steel	.....	15.00 to 15.50
Drop forge flashings	.....	8.00 to 8.50
Hydraulic compressed sheet	.....	8.50 to 9.00
Axle turnings	.....	9.00 to 9.50
Per Net Ton		
Iron angles and splice bars	.....	14.50 to 15.00
Steel angle bars	.....	11.50 to 12.00
Iron arch bars and transoms	.....	15.50 to 16.00
Iron car axles	.....	20.00 to 20.50
Steel car axles	.....	13.50 to 14.00
No. 1 busheling	.....	9.00 to 9.50
No. 2 busheling	.....	6.25 to 6.75
Cut forge	.....	11.00 to 11.50
Pipes and flues	.....	7.00 to 7.50
No. 1 railroad wrought	.....	11.50 to 12.00
No. 2 railroad wrought	.....	11.00 to 11.50
Steel knuckles and couplers	.....	12.00 to 12.50
Coil springs	.....	13.75 to 14.25
No. 1 machinery cast	.....	13.00 to 13.50
No. 1 railroad cast	.....	12.75 to 13.25
Low phos. punchings	.....	11.50 to 12.00
Locomotive tires smooth	.....	10.50 to 11.00
Machine shop turnings	.....	4.00 to 4.50
Cast borings	.....	6.25 to 6.75
Stove plate	.....	12.50 to 13.00
Grate bars	.....	11.50 to 12.00
Brake shoes	.....	11.25 to 11.75
Railroad malleable	.....	12.50 to 13.00
Agricultural malleable	.....	12.50 to 13.00

Plates.—A local fabricator is asking for protection on from 15,000 to 20,000 tons of plates for storage tanks wanted by the Humphrey and Humble Oil companies in the Mexia fields. No additional orders for steel to apply against railroad car contracts are

reported, although a large tonnage is pending. The price situation shows little change. On attractive business, 1.60c., Chicago, is being done, while smaller orders are being booked at from \$2 to \$3 higher.

The ruling mill quotations range from 1.60c. to 1.75c. Chicago. Jobbers quote 2.78c. for plates out of stock.

Wire Products.—Demand is diminishing as the close of the year approaches and prices are not so firm as they were. For mill prices, see finished iron and steel, f. o. b. Pittsburgh, page 1446.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, \$3.48 per 100 lb.; No. 9 and heavier bright basic wire, \$3.63 per 100 lb.; common wire nails, \$3.65 per 100 lb.; cement coated nails, \$3.05 per keg.

Warehouse Prices.—The recent advance on black annealed and bright basic wire has been withdrawn and the former quotations of \$3.48 and \$3.63 respectively have been reinstated.

New York

NEW YORK, Nov. 29.

Pig Iron.—More activity developed in the past week than was expected and sales included 700 tons to a Connecticut buyer, 400 tons to the New York Central Railroad, 1000 tons to a boiler company at Elizabeth, N. J., 900 tons for a heating equipment manufacturer, 850 tons for a railroad appliance company, and numerous small lots. All of this iron is for delivery this year except that a part of the boiler company's tonnage may be delivered in January. Little information was disclosed as to prices, but the usual quotation on No. 2 plain eastern Pennsylvania is \$20 to \$21, and on Buffalo iron from \$19 to \$20. The principal inquiry now in the market is for 1200 tons for the first quarter for the Pennsylvania Railroad for delivery at Altoona. Some foundries are increasing their melt and the jobbing foundry of Taylor & Co., Brooklyn, is again on a 6-day schedule with full force.

We quote delivered in the New York district as follows, having added to furnace prices \$2.52 freight from eastern Pennsylvania, \$5.46 from Buffalo and \$6.16 from Virginia:

East. Pa. No. 1 fdy., sil.	2.75 to 3.25	.....	\$24.52 to \$25.52
East. Pa. No. 2X fdy., sil.	2.25 to 2.75	.....	23.52 to 24.52
East. Pa. No. 2 fdy., sil.	1.75 to 2.25	.....	22.52 to 23.52
Buffalo, sil.	1.75 to 2.25	.....	24.46 to 25.56
No. 2 Virginia, sil.	1.75 to 2.25	.....	29.16

Ferroalloys.—There is almost no demand for ferromanganese, although the leading steel producer is reported to have sold 100 tons recently at \$60, Pittsburgh. A rumor that British prices were to be advanced has not been confirmed. Imports in October were heavier than in some months at 1943 tons. No inquiry or sales of spiegeleisen are reported, nor is there any sign of interest in the manganese ore market. Imports of the ore in October were high at 36,760 tons, which compares with an import rate of 14,823 tons per month in the third quarter. Prices for 50 per cent ferrosilicon are again fairly firm at \$60, delivered, but very little demand is reported. Quotations are as follows:

Ferroalloys	
Ferromanganese, domestic, delivered, per ton,	\$60.00 to \$63.00
Ferromanganese, British, seaboard, per ton,	\$58.35
Spiegeleisen, 20 per cent, furnace, per ton,	\$25.00 to \$26.00
Ferrosilicon, 50 per cent, delivered, per ton,	\$60.00
Ferrotungsten, per lb. of contained metal, 48c. to 58c.	
Ferrochromium, 6 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr., delivered, 10c. to 14c.	
Ferrovanadium, per lb. of contained vanadium	\$4.50
Ferrocobaltititanium, 15 to 18 per cent, net ton	\$200.00
Ferrocobaltititanium, 15 to 18 per cent, 1 ton to carloads, per ton	\$220.00
Ferrocobaltititanium, 15 to 18 per cent, less than 1 ton, per ton f.o.b. Niagara Falls, N. Y.	\$250.00

Ores	
Manganese ore, foreign, per unit, seaboard	20c.
Tungsten ore, per unit, in 60 per cent concentrates	\$2.50 up
Chrome ore, 40 to 45 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard	\$20.00 to \$25.00
Chrome ore, 45 to 50 per cent Cr ₂ O ₃ , crude, per net ton, Atlantic seaboard	\$30.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₃ , New York	50c. to 60c.

Warehouse Business.—Prices are generally unchanged in this district, but blue annealed sheets at 3.53c. per lb. are rather weak, caused by the present mill quotations as low as 2.25c. per lb. No change in the situation is expected before the middle of January. Further approach to anything like the pre-war differential between mill and warehouse prices is deemed impossible under present high costs of handling material. Delivery free in the Metropolitan district seldom is quoted, no charge being made in many instances for trucking less than a load from Brooklyn to Yonkers, Jersey warehouses to Coney Island, or Flushing or Jersey points. This, added to higher wages to drivers and employees in the warehouse, makes the present \$12 and \$13 differential less profitable than the pre-war \$8 to \$10 spread. Wrought iron and steel pipe warehouses report business extremely dull. Dealers in brass and copper continue to report fair activity. We quote prices on page 1458.

High-Speed Steel.—Buying in this field continues at a minimum. Producers continue to quote 90c. per lb. for 18 per cent tungsten high-speed steel, which is the market, although sales have been made lower, where some producer found himself carrying an overstock and a large quantity was involved.

Finished Iron and Steel.—Buyers seem to be waiting for the new year. Their buying at present is confined to very small lots with the object of carrying as little material as possible in year-end inventories. In common with the slowness in other lines, structural steel lettings and inquiries show a decline, but this is believed to be due partly to the imminence of a new scale of wages in the building trades, present contracts with the workers expiring Jan. 1. The largest job of the week is for new subway construction in Forty-second Street, the general contract for which has been let to the Powers-Kennedy Corporation. The steel, amounting to about 3100 tons, will be fabricated by the American Bridge Co. Bids have gone in on a highway bridge at Annapolis, Md., which will require 700 tons of shapes and a larger tonnage of steel bars. Bids will be opened Dec. 19 on the caissons for the Philadelphia-Camden bridge, this work requiring 1500 tons. A building for the Young Men's and Young Women's Hebrew Association of Newark calls for 900 tons. The Sinclair Consolidated Oil Corporation has inquired for tanks involving 10,000 tons of plates. The same company has increased its inquiry for steel pipe, referred to last week, requiring 20,000 instead of 14,000 tons. The Texas Co. is inquiring for 600 tons of oil pipe. Another oil company recently inquiring for 1200 tons of plates has closed for 2400 tons. Much of the present larger activity in the market, which is confined mostly to inquiries, is due to plans of the railroads and oil companies for development. In the railroad field the inquiries for new cars continue at a fair rate. Close to 12,000 cars are now pending, this including the formal inquiry of the Burlington, just issued, calling for bids on 3000 composite gondolas, 2500 steel frame box cars and 1300 refrigerator cars, a total of 6800. The Great Northern has come into the market for 1000 box cars, 500 all-steel gondolas and 500 refrigerator cars. The Illinois Central's inquiry for 2500 gondolas is still pending. The Pere Marquette is inquiring for 500 to 2000 box cars. The Lehigh Valley road has asked bids on the repair of 500 hopper and gondola cars. Although the inquiry is not yet out, it is expected that the Union Pacific will inquire shortly for 6000 cars, mostly of the refrigerator type. The Pennsylvania is also expected to inquire for a large number of new cars. The Baltimore & Ohio has divided 1000 cars between two companies, though little new steel will be required. Bids for 100,000 to 200,000 heavy rails for the New York Central's 1922 requirements were opened last Friday. Bidders were the Carnegie, Illinois, Bethlehem, Lackawanna, Cambria and Inland steel companies. The last-named company is now installing equipment for rolling rails. Bids were uniform at \$40 for open-hearth first quality and \$38 for the usual 5 per cent second quality rails. There were also bids on about 5000 to 10,000 tons of angle bars. The low bid was 2.40c., mill, put in by the Inland Steel Co. The Cambria Steel Co. bid 2.55c.,

mill, on both Bessemer and open hearth. Other bids were uniform at 2.55c. for Bessemer and 2.60c. for open hearth, although all companies did not bid on Bessemer steel.

We quote for mill shipments, New York, as follows: Soft steel bars, 1.80c. to 1.88c.; plates, 1.88c. to 2.03c.; structural shapes, 1.88c. to 2.03c.; bar iron, 1.98c. to 2.03c. On export shipments the freight rate is now 28.5c. per 100 lb., instead of 38c., the domestic rate.

Cast-Iron Pipe.—Inquiries for large tonnages for delivery for next year are coming into the market with satisfactory volume. Some specify delivery during the winter months, whereas others ask for spring delivery. Inquiries from abroad persist, but the unfavorable exchange prevents business. We quote per net ton, f.o.b. New York, carload lots, as follows: 6-in. and larger, \$47.30; 4-in. and 5-in., \$52.30; 3-in., \$62.30, with \$4 additional for Class A and gas pipe.

Old Material.—Headed by heavy melting steel, which dropped 50c. during the week, all other principal items have receded in price accordingly. The drop in steel was precipitated when an Eastern Steel company reduced its offering price by 50c. The drop of the market is expected, since this is a dull period of the year. There is a scarcity of No. 1 machinery cast. Light iron has become a drug on the market and most dealers are having it removed from yards as rubbish. Accordingly, we are dropping it from our quotations. A New York broker warns the buying staff of his firm: "Market shows further signs of weakness. Make all contracts call for shipment within two weeks."

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard.....	\$7.50 to \$8.00
Steel rails, short lengths, or equivalent	9.00 to 9.50
Rerolling rails	10.00 to 11.00
Relaying rails, nominal.....	30.00 to 35.00
Steel car axles.....	12.00 to 12.50
Iron car axles.....	20.00 to 21.00
No. 1 railroad wrought.....	12.00 to 12.50
Wrought iron track.....	9.00 to 9.50
Forge fire	5.00 to 5.50
No. 1 yard wrought, long.....	9.00 to 9.50
Cast borings (clean).....	6.50 to 7.00
Machine-shop turnings	4.50 to 5.00
Mixed borings and turnings.....	4.50 to 5.00
Iron and steel pipe (1 in. diam. not under 2 ft. long).....	8.25 to 8.75
Stove plate	10.00 to 10.50
Locomotive grate bars.....	10.00 to 10.50
Malleable cast (railroad).....	8.50 to 9.00
Car wheels	11.00 to 11.50

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast.....	\$17.00 to \$18.00
No. 1 heavy cast (columns, building materials, etc.), cupola size.....	16.00 to 17.00
No. 1 heavy cast, not cupola size.....	16.00 to 16.50
No. 2 cast (radiators, cast boilers, etc.)	10.00 to 10.50

Buffalo

BUFFALO, Nov. 29.

Pig Iron.—Nine furnaces out of a complement of 22 are now in blast and five of the nine are on foundry iron. Sales of about 6000 tons represent the combined activities of all factors. It is generally assumed that foundry operation is about 25 per cent of normal; improvement is not expected until 1922 is well under way. One furnace announces it has taken a firm stand for \$20 base price and that sales in of 2000 tons, one lot of 800 tons and one of 500 tons represent the largest individual purchases; the rest of the business consisted of carload lots. A radiator interest is expected to come into the market within a few days for a substantial tonnage. The largest inquiry now in hand is for 1000 tons for a New England purchaser. The total tonnage inquired for with one furnace is about 4500 tons.

We quote f.o.b. dealers' asking prices per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil.....	\$20.00
No. 2X foundry, 2.25 to 2.75 sil.....	19.50
No. 2 plain, 1.75 to 2.25 sil.....	19.00
Basic	21.00
Malleable	21.00
Lake Superior charcoal.....	31.75

Finished Iron and Steel.—Car business, both repair work and new stock, has brought out better orders for plates. Bar orders are more lively than in recent

weeks and a number of small tonnages in shapes have appeared. The Federal Ice Co., Buffalo, will erect a building involving 300 tons of shapes. The structural requirements for the additions to the National Biscuit Co. plant requiring 2000 tons of shapes have been placed with the Lackawanna Bridge Co. Tin plate is dull locally because of the season's close, but elsewhere it is understood demand has been strong; can manufacturers are apparently satisfied that prices are lowest obtainable for some time. A bid of \$40 per ton on rails on which the New York Central Railroad asked prices was made by a local rail interest, but no award is expected within ten days or two weeks. Effective Nov. 21, price on sheets as announced by a sheet mill are: No. 10 gage blue annealed, \$2.25; No. 28 gage black, \$3, on cars Pittsburgh.

Warehouse Business.—Little of moment has occurred and business is about on the plane it has been on since September. One interest which carries a line of machine tools finds increased inquiry and the sale of a battery of nail-making machinery is recorded. Structural shapes have been in fair demand because of seasonal advantages.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 2.80c.; plates, 2.80c.; plates, No. 8 gage, 3.50c.; soft steel bars and shapes, 2.70c.; hoops and bands, 3.30c.; blue annealed sheets, No. 10, 3.55c.; galvanized steel sheets, No. 28, 5.25c.; black sheets, No. 28, 4.25c.; cold-rolled strip steel, 5.90c.; cold-rolled round shafting, 3.80c.

Coke.—Inquiry is lifeless and sales are for small lots only. Prices have not changed.

Old Material.—Stronger demand for heavy melting steel and turnings and borings is apparent, but very little steel is available, and there is little production in the latter materials. The \$13.50 price on steel holds firm. None of the dealers has a great amount of steel to offer.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel.....	\$13.00 to \$14.00
Low phos., 0.04 and under.....	17.00 to 18.00
No. 1 railroad wrought.....	15.00 to 16.00
Car wheels.....	16.50 to 17.50
Machine shop turnings.....	7.50 to 8.00
Cast iron borings.....	7.00 to 8.00
Heavy axle turnings.....	10.50 to 11.50
Grate bars.....	12.00 to 13.00
No. 1 busheling.....	10.00 to 11.00
Stove plate.....	15.00 to 16.00
Bundled sheet stampings.....	8.00 to 9.00
No. 1 machinery cast.....	17.00 to 18.00
Hydraulic compressed.....	10.50 to 11.50
Railroad malleable.....	13.00 to 14.00

Birmingham

BIRMINGHAM, ALA., Nov. 29.

Pig Iron.—Birmingham iron settled to an \$18 base before the close of the month with no pretense of a higher one. One furnace maker sent out circular letters to the trade about Nov. 22 making an open offering of the product at \$18 and brokers made the same offering for the same interest. Sales by brokers would make the net price under \$18. The volume of business has been small, a 200-ton lot for an adjoining State being the principal transaction. The usual order has been for car lots for rush shipment. One maker's week's bookings were 250 tons and those of another were 500 tons. There is no inquiry for 1922. Interest in the market has reached a new low level. On the other hand, the outgo has been satisfactory. One active interest on Nov. 24 showed shipment of make to date and the movement of the greater part of very small stock accumulations. The largest active maker has also moved its make. This indicates that the iron ordered has been needed and that there has been a dearth of anticipation of needs. Operators seem reconciled to a state of inactivity until after the holidays and hope for the arrival of the time when the strong position of stocks will exert its influence, as it would if any kind of real buying movement were to ensue. Radiator plants remain at 100 per cent, but, with the exception of stove works and pipe shops, Southern melt is not increasing.

We quote per gross ton f.o.b. Birmingham district furnaces, as follows:

Foundry, silicon 1.75 to 2.25.....	\$18.00
Basic.....	17.00
Charcoal, warm blast.....	35.00

Finishing Mills.—The Tennessee company was on the same scale this as last week, one of 55 per cent with the rail mill at 6,000 tons capacity. The Connors Steel Co. is operating one of its hoop and band mills at Woodlawn, but the Calera mill remains down. This business has been jerky for several months. Sheets and steel pipe are fairly active. The Gulf States Steel Co. is making new high records of daily production in wire and rod mills. Wire drawing mill operations of the district remain at 70 to 75 per cent with demand easing off except as to nails.

Cast Iron Pipe.—Sanitary pipe shops continue at 75 to 80 per cent of production on old orders. New business is not coming in. Brokers will not talk 1922 business. September and October were unusually good. High pressure pipe plants are also fairly active on past business, but very little came to the front last week. Base of sanitary remains at \$40 and of high pressure at \$34.

Coal and Coke.—Coke has eased up and prices rule from \$5.50 to \$6 for beehive and by-product with \$8 for the new pitch coke being made by the Barrett Co., in beehive ovens from residue pitch on their Tarvia factory yards. The pitch is 98 per cent carbon and has stood tests.

Old Material.—The scrap market is as dull as pig iron. Prices are nominal, because there is a dearth of trading.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails.....	\$11.00 to \$12.00
No. 1 steel.....	10.00 to 11.00
No. 1 cast.....	15.00 to 16.00
Car wheels.....	15.00 to 16.00
Tramcar wheels.....	12.00 to 13.00
No. 1 wrought.....	13.00 to 14.00
Stove plate.....	11.00 to 12.00
Cast iron borings.....	6.00 to 7.00
Machine shop turnings.....	6.00 to 7.00

St. Louis

ST. LOUIS, NOV. 29.

Pig Iron.—The continued talk of lower freight rates is holding back buying of pig iron. Melters are not overloaded with orders, and they are just buying sparingly, so that they may be able to enjoy any reduction that might be made in freight rates. Northern iron is being sold on the basis of \$20 and \$21, Chicago. The market for Southern iron is at \$18, Birmingham, with some offers at \$17.50. Sales during the week included 300 tons of foundry iron to a Western car wheel maker and 100 tons to an Indiana implement manufacturer, with the usual run of carload orders. An Illinois car wheel maker is in the market for 1300 tons of foundry iron. Seven reporting stove foundry interests in the Eighth Federal District show October sales 4 to 10 per cent under those in September and 10 to 25 per cent under the corresponding month in 1920.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.88 freight and war tax from Chicago and \$5.91 from Birmingham:

Northern foundry, sil. 1.75 to 2.25.....	\$22.88 to \$23.88
Northern malleable, sil. 1.75 to 2.25.....	22.88 to 23.88
Basic.....	22.88 to 23.88
Southern foundry, sil. 1.75 to 2.25.....	23.91

Finished Iron and Steel.—The biggest order for rails placed here for some time was the Cotton Belt's requirements of 10,000 tons of 85-lb. rails, which went to the Illinois Steel Co., a subsidiary of the United States Steel Corporation. These are that road's 1922 requirements, and first deliveries will be made in early spring. No new requisitions were issued by railroads during the week. The buying of tanks for Southern oil fields continues. The Humphrey-Mexia Co., which is headed by Col. A. E. Humphrey, who discovered the Mexia (Tex.) oil fields, has placed orders for 55 steel tanks each of 55,000 barrel capacity, divided among the following: Warren City Tank & Boiler Co., Warren, Ohio; Petroleum Iron Works, Sharon, Pa.; Graver Corporation, Chicago; Riter-Conley Co., Pittsburgh, and Stacey Bros. Gas & Construction Co., Cincinnati. The demand for structural steel has ceased pending the result of the conference between the Building Trades Council and the master builders. The Hotel Jefferson

addition, involving 1400 tons of structural shapes and bars, is still in the hands of the engineers.

For stock out of warehouse we quote: Soft steel bars, 2.87½c. per lb.; iron bars, 2.87½c.; structural shapes, 2.97½c.; tank plates, 2.97½c.; No. 10 blue annealed sheets, 3.47½c.; No. 28 black sheets, cold rolled, one pass, 4.10c.; cold drawn rounds, shafting and screw stock, 4.20c.; structural rivets, \$3.77½ per 100 lb.; boiler rivets, \$3.87½; tank rivets, 7/16 in. and smaller, 60-10 per cent off list; machine bolts, large, 55 per cent; small, 60 per cent; carriage bolts, large, 50-5 per cent; small, 55 per cent; lag screws, 60 per cent; hot pressed nuts, square or hexagon blank, \$3.25; and tapped, \$3.00 off list.

Coke.—The coke market is very quiet, consumers holding off in their buying in anticipation of an early advance in freight rates. A western Missouri melter placed an order for 1,000 tons of foundry coke for delivery during the balance of this year and first quarter of 1922.

Old Material.—The market continues weak and prices are softening all down the line. Consumers still decline to purchase at prevailing prices, contending they are at present only interested in reducing their inventory of raw materials. Hence dealers have been forced to unload some of their stocks at concessions only two railroads offering this week: Burlington, 7000 tons, and an open list by the New York Central and Big Four.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton		
Old iron rails.....	\$15.50 to	\$16.00
Steel rails, rerolling.....	12.50 to	13.00
Steel rails, less than 3 ft.....	13.00 to	13.50
Relaying rails, standard section.....	25.00 to	30.00
Cast iron car wheels.....	15.00 to	15.50
No. 1 heavy railroad melting steel.....	11.00 to	11.50
No. 1 heavy shoveling steel.....	10.50 to	11.00
Ordinary shoveling steel.....	10.00 to	10.50
Frogs, switches and guards cut apart.....	11.00 to	11.50
Ordinary bundle sheet.....	4.00 to	4.50
Per Net Ton		
Heavy axles and tire turnings.....	6.50 to	7.00
Iron angle bars.....	13.00 to	13.50
Steel angle bars.....	10.00 to	10.50
Iron car axles.....	20.00 to	21.00
Steel car axles.....	14.00 to	14.50
Wrought iron arch bars and transoms.....	15.00 to	15.50
No. 1 railroad wrought.....	10.50 to	11.00
No. 2 railroad wrought.....	9.50 to	10.00
Railroad springs.....	11.50 to	12.00
Steel couplers and knuckles.....	11.50 to	12.00
Locomotive tires 42 lb. and over, smooth inside.....	9.50 to	10.00
No. 1 dealers' forge.....	9.00 to	9.50
Cast iron borings.....	6.50 to	7.00
No. 1 busheling.....	10.00 to	10.50
No. 1 boilers cut in sheets and rings.....	8.00 to	8.50
No. 1 railroad cast.....	14.50 to	15.00
Stove plate and light cast.....	12.50 to	13.00
Railroad malleable.....	10.00 to	10.50
Agricultural malleable.....	9.50 to	10.00
Pipes and flues.....	7.50 to	8.00
Heavy railroad sheet and tank.....	6.50 to	7.00
Light railroad sheet.....	4.50 to	5.00
Railroad grate bars.....	10.00 to	10.50
Machine shop turnings.....	6.00 to	6.50
Country mixed iron.....	7.50 to	8.00
Uncut railroad mixed.....	8.50 to	9.00
Horse shoes.....	11.00 to	11.50
Railroad brake shoes.....	9.50 to	10.00

Cleveland

CLEVELAND, Nov. 29.

Iron Ore Carrying and Dock Rates.—The railroads have declined to make, at the present time, the 28 per cent reduction in charges for handling ore at lower lake ports as asked for by ore shipping and consumer interests which held that these charges should be reduced in the same proportion as the ore carrying rates. Had this reduction been made, it would have restored the ore handling charges that prevailed before the 40 per cent advance in September, 1920. The matter was recently taken up with the ore, coke and coal committee of the railroads which had approved the reduction and it was expected that the railroads would order it placed in effect. The railroad executives decided to postpone any action on the dock handling rates until March, when they will again take under consideration the ore carrying charges from Lake Erie ports to interior furnaces. While the action of the railroads in extending the present reduced ore carrying rates from Dec. 31 to March 31 meets the approval of shippers and consumers, its effect on operating costs will be very slight. Although the extension of the lower rates until April 1 will give consumers an opportunity to move off the docks at the lower carrying charges all the ore they will need before the opening of navigation, most consumers would have

been able to do this even if present carrying rates had not been extended beyond Jan. 1. Consumers have been taking some dock ore in anticipation of the possible restoration of the higher carrying rates on Jan. 1 and shippers expect that the only noticeable effect of the extension of the present rates to April will be the withholding of shipping orders during December until some time prior to April 1. Some dock shipments scheduled for December have already been cut off.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, \$6.45; Old range non-Bessemer, 51½ per cent iron, \$5.70; Mesabi Bessemer, 55 per cent iron, \$6.20; Mesabi non-Bessemer, 51½ per cent iron, \$5.55.

Mining Operations.—Many of the mining companies will resume the operation of their underground mines this winter providing the miners indicate a desire to return to their work at a wage reduction. Several mines have resumed operations in the Menominee range at an established scale of \$2.10 for common labor for a 9 hr. day. Two mines in the Gogebic range have resumed operations at part time at the old scale of \$3.05 for a 10 hr. day for common labor.

Iron Ore Shipments.—The ore shipping season closed Monday with the dispatch of the last cargoes from Ashland. The November movement was 406,451 gross tons and the total for the season was 22,300,726 tons. A tabulation of shipments by ports will be found in another column.

Pig Iron.—The past week has been about the quietest of the present year in the pig iron market. The only inquiry of any size was for 4000 tons of basic iron from a Portsmouth, Ohio, consumer. On this inquiry a lake furnace quoted \$19, but it was reported that the business would be placed with a southern Ohio producer at about \$19.50, as the lake furnace has a freight disadvantage of about \$2 a ton. Sales of foundry iron during the week were very light, the largest order being for 100 tons. One seller booked only 700 tons in small lots and others sold smaller amounts. A carlot sale of low phosphorus iron was made at \$34. There is virtually no change in the price situation. The market is weak with \$20 as the usual quotation by lake furnaces for foundry iron, with local furnaces holding at \$20.50 for Cleveland delivery. However, a local producer is still quoting a \$20 Valley base for shipment from Cleveland which, in the case of some quotations made during the week, meant a price lower than \$20 at furnace. November shipments on the whole fell considerably below October. While some makers have shipped about as much iron this month as in the previous month, shipments of others fell off to 50 per cent or more as compared with shipments during October when the buying was stimulated by purchases in anticipation of early requirements because of the threatened railroad strike. Consequently, a few foundries which had been buying from month to month, purchased no iron in November, but are expected to come in the market in December.

Quotations below are f.o.b. local furnace for northern foundry iron, not including a 56c. switching charge. Other quotations are delivered Cleveland, being based on a \$1.96 freight rate from Valley points, a \$3.36 rate from Jackson and a \$6.67 rate from Birmingham:

Basic.....	\$20.96
Northern No. 2 fdy., sil. 1.75 to 2.25.....	20.00 to 21.00
Southern fdy., sil. 2.25 to 2.75.....	25.17
Ohio silvery, sil. 8 per cent.....	32.86
Standard low phos., Valley furnace.....	34.00 to 35.00

Finished Iron and Steel.—The leading interest reports a marked increase during the week in the number of orders for small lots of steel. However, with most of the independent mills the volume of business continues light. Several of the selling agencies booked a little more business in this territory during November than during October. The past week has shown an improvement in the demand from steam shovel manufacturers, who report an improvement in sales and a little more activity on the part of some other consumers. The Brown Hoisting Machinery Co. has taken an ore-handling bridge for the Wisconsin Steel Co. requiring 500 tons of steel, and the Cambria Steel Co. is negotiating for an ore bridge. Considerable demand is still appearing for steel for car and locomotive repair work. Repair work for the Wheeling & Lake Erie Railroad will require 800 tons of steel. The demand from the Western oil field for oil and tank work continues active, but with the present condition of the market tank shops are bidding on work without first getting protection on

steel prices. Some orders are being placed for steel for January shipment by consumers who wish to delay deliveries in order to avoid placing the material in their inventories. The price situation shows no change. Mills are apparently generally holding to a minimum price of 1.50c. on steel bars, plates and structural material for desirable orders, but a 1.60c. price appears to be the more common quotation for the small lots that are being sold. Local mills are quoting plates at 1.75c. Hard-rolled strip steel is weak, being quoted as low as 2c., at which some business has been taken for January shipment. Hard steel reinforced bars are inactive with 1.50c. as the usual quotation for a sizable order. In structural lines no new inquiries have come out. The only contract reported is for 150 tons for two buildings for the American Car & Foundry Co. taken by the Austin Co., Cleveland.

Jobbers quote steel bars, 2.54c.; plates and structural shapes, 2.64c.; No. 9 galvanized wire, 3.50c.; No. 9 annealed wire, 3.25c.; No. 28 black sheets, 3.75c.; No. 28 galvanized sheets, 4.75c.; No. 10 blue annealed sheets, 3.10c.; hoops and bands, 3.14c.; cold-rolled rounds, 3.85c.; flats, squares and hexagons, 4.35c.

Sheets.—The Ford Motor Co. has placed 700 tons of blue annealed sheets with a Youngstown district mill for December requirements. This purchase was larger than expected in view of the report that the Ford company will shut down its plant about Dec. 15 for inventory. With the price announcement of the American Sheet & Tin Plate Co. naming 3c. for black, 4c. for galvanized, and 2.25c. for blue annealed sheets for the first quarter, the regular quotations of the leading producers and independent mills are now uniform. While most mills are adhering to these prices, there is evidence that the 2.75c. price on black sheets has not disappeared.

Warehouse Business.—New demand is light. With the naming of new sheet prices by the leading interest the Carnegie Steel Co. has reduced its warehouse price on blue annealed sheets to 3.14c., this being based on a 2.25c. mill price, but this price is slightly higher than has been quoted for some time by the other warehouses.

Bolts and Nuts.—The demand for bolts and nuts is rather slow and limited to small lots. Makers look for little improvement until after inventory time. The demand for rivets which recently showed a little revival has fallen off. Rivet prices continue weak.

Old Material.—The market continues dull and prices are weaker. Heavy melting steel, compressed steel and some other grades have declined about 50c. a ton. There is virtually no buying by mills in any of the Ohio districts. In addition to the absence of a demand from consumers, two Ohio mills, during the week, ordered shipments suspended, one cutting off shipments of heavy melting steel and the other of turnings. A Cleveland mill during the week purchased a small tonnage of machine shop turnings at \$7.50. A Buffalo mill is credited with a purchase of 13,000 tons of heavy melting steel scrap from a Buffalo dealer who is closing out his yard stock. With the recent decline in prices, some of the local dealers seem inclined to again buy scrap for yard stocks.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel.....	\$11.00 to \$11.50
Steel rails, under 3 ft.....	12.25 to 12.50
Steel rails, rerolling.....	13.50 to 14.00
Iron rails.....	11.00 to 12.00
Iron car axles.....	18.00 to 19.00
Low phosphorus melting scrap.....	12.50 to 13.00
Cast borings.....	8.00 to 8.50
Machine shop turnings.....	6.75 to 7.25
Mixed borings and short turnings.....	8.00 to 8.50
Compressed steel.....	9.00 to 9.25
Railroad wrought.....	12.00 to 12.50
Railroad malleable.....	11.75 to 12.00
Light bundled sheet stampings.....	6.00 to 7.00
Steel axle turnings.....	9.00 to 10.00
No. 1 cast.....	15.00 to 16.00
No. 1 busheling.....	8.25 to 8.75
Drop forge flashings, over 10 in.....	7.50 to 8.00
Drop forge flashings, under 10 in.....	7.50 to 8.00
Railroad grate bars.....	12.75 to 13.00
Stove plate.....	13.00 to 13.25
Pipes and flues.....	8.50 to 9.00

The Board of Awards, office of the City Register, City Hall, Baltimore, will take bids until 11 a. m., Dec. 7, for a quantity of cast iron pipe, pipe fittings and special castings for the water department, William A. Megraw, water engineer. Recent bids received were rejected. The material is estimated to cost close to \$250,000.

Boston

BOSTON, Nov. 29.

Pig Iron.—The market on eastern Pennsylvania iron is steadier. Offerings at \$20 furnace base are fewer, resale iron has again disappeared, more furnaces are holding to full 50c. differentials on lower silicons and \$1 on the higher. On large tonnages, \$19 base Buffalo furnace can be done, but most business is at \$19.50 or slightly less. Few furnaces or consumers are interested in 1922 supplies as yet. Two furnaces this week endeavored without success to close with a Massachusetts foundry, which previously signified its willingness to purchase 5000 to 6000 tons low silicon iron for first half delivery. This and other melters are expected to come into the market during December. Two new small inquiries developed this week, one for 250 tons and the other 150 tons to be purchased in December. Business prospects otherwise are confined to car lots, mostly for No. 2X and No. 1X, but including malleable and charcoal. Of the Rhode Island inquiry for 450 tons, silicon 2.25 to 2.75, noted last week, 350 tons has been taken at prices above the lowest quoted. A sale of 100 tons of Buffalo iron, silicon 1.75 to 2.25, is noted this week, the first reported in some time. The average foundry, based on operating schedules, finds it more profitable to use machinery cast than No. 2 plain pig, as the spread between the delivered prices of the two materials amounts to several dollars per ton in favor of scrap.

We quote delivered at common New England points as follows, having added to furnace prices \$4.06 freight from eastern Pennsylvania, \$5.46 from Buffalo, \$6.58 from Virginia and \$10.66 from Alabama:

East. Penn., silicon 2.25 to 2.75.....	\$24.56 to \$25.56
East. Penn., silicon 1.75 to 2.25.....	24.06 to 25.06
Buffalo, silicon 2.25 to 2.75.....	24.46 to 25.46
Buffalo, silicon 1.75 to 2.25.....	24.46 to 25.46
Virginia, silicon 2.25 to 2.75.....	30.08 to 31.08
Virginia, silicon 1.75 to 2.25.....	29.58 to 30.58
Alabama, silicon 2.25 to 2.75.....	30.16
Alabama, silicon 1.75 to 2.25.....	29.66

Coke.—Additional contracts for first half, 1922, by-product foundry coke have been placed the past week by New England melters at the price ruling at date of shipment. Such business, however, as well as releases on 1921 contracts, involves comparatively small tonnages, the movement from ovens showing little appreciable increase, with no prospect of becoming better the rest of the year. Fuel producers say they will be doing well to maintain shipments during December on the present basis. Both the New England Coal & Coke Co., Boston, and the Providence Gas Co., Providence, R. I., continue to quote foundry coke on a basis of \$10.66 delivered where the local freight does not exceed \$3.40. Railroads have notified oven interests they are willing to establish a through rate on coke from Boston to Montreal of \$4.90, as against \$6.30, the present rate. The conceded rate is not as low as desired by the coke makers and places them at a disadvantage when competing with Detroit shippers for Montreal business. The New England coke makers nevertheless will ask the carriers to put the new rate into effect at once. With the new rate Detroit shippers will have a freight rate advantage of 60c. a ton.

Old Material.—The undertone of the old material market is unmistakably easier, yet prices show little change due to lack of business since last reports. Dealers admit, however, new business can only be closed at concessions from prices obtained last week, and a downward revision in quotations can be expected on any market activity. In only two instances can prices be actually quoted lower this week, namely, forged scrap at \$4.50 to \$5, and cotton ties at \$5. These materials are all of 50c. lower, on the withdrawal of buyers from the market. A Coatesville, Pa., mill apparently is the only consumer of forged scrap interested just now. In contrast, wrought scrap is active and strong on buying by makers of horseshoes. The Grand Trunk Railroad has sold 1000 tons rerolling rails to a Portland, Me., dealer, at approximately \$12, f.o.b. Portland. Massachusetts foundry interests bought 500 tons of textile cast at 80c. per 100 lb. delivered. Other small sales to New England melters, mostly No. 1 machinery cast at about \$19 delivered, are noted, but

the market generally is very quiet. There is an inquiry for a small tonnage of broken steam railroad wheels in the market.

The following are for gross ton lots delivered consuming points:

No. 1 machinery cast.....	\$18.00 to \$19.00
No. 2 machinery cast.....	16.00 to 17.00
Stove plate.....	15.50 to 16.00
Railroad malleable.....	13.50 to 14.00

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.....	\$8.00 to \$8.25
No. 1 railroad wrought.....	13.00 to 13.50
No. 1 yard wrought.....	10.50 to 11.00
Wrought pipe (1-in. in diameter, over 2 ft. long).....	8.00 to 8.50
Machine shop turnings.....	4.00 to 4.50
Cast iron borings, rolling mill.....	5.50 to 6.25
Cast iron borings, chemical.....	6.50 to 6.75
Blast furnace borings and turnings..	3.50 to 4.00
Forged scrap and bundled skeleton..	4.50 to 5.00
Street car axles and shafting.....	11.50 to 12.00
Car wheels.....	11.00 to 12.00
Rerolling rails.....	10.50 to 11.00

Cincinnati

CINCINNATI, Nov. 29.

Pig Iron.—An inquiry for 4000 tons of basic from an Ohio River steel plant featured the market during the week. The iron is wanted for December shipment, but has not yet been purchased, as it is reported that the company is considering lighting its own furnace. An Illinois car manufacturing plant is inquiring for 1000 tons of high silicon malleable iron for first quarter and two inquiries for foundry iron for the same delivery from Indiana melters, aggregating 500 tons, are before the trade. With these exceptions, inquiry is confined almost exclusively to one and two carloads. As regards sales, the week was quiet. A Dayton melter took two cars of Southern iron at \$18, base, and a Columbus melter two cars of Northern at \$20, lake furnace. An Ohio steel plant which recently purchased some basic iron is understood to have added a considerable tonnage to the original order, making its total purchases in the neighborhood of 10,000 tons. Prices in the North are reported firm at \$20, furnace, in all districts, while in the South occasional reports are heard of \$17.50 being quoted. In this territory, sales of Southern iron are being made at \$18, base, but it is considered probable that an attractive tonnage could be placed under this figure.

Based on freight rates of \$4.50 from Birmingham and \$2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	\$22.50
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	23.00
Ohio silvery, 8 per cent sil.....	30.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	\$22.52 to 23.52
Basic, Northern.....	22.02
Malleable.....	23.52

Finished Material.—A number of inquiries for concrete reinforcing bars appeared during the week, the largest being for 500 tons for shipment during the first quarter. Another inquiry for 400 tons is pending and one of 200 tons for a building which will soon be erected in Cincinnati is expected to be closed shortly. It is reported that 200 tons of reinforcing bars for the Central Y. M. C. A. building at Columbus, Ohio, has been taken by an independent mill at a price of approximately 1.62½c., delivered. Some wire and nail business was placed during the week, including one order for 100 tons of nails at \$2.90 per keg, Pittsburgh. There is little activity in sheets, although the American Sheet & Tin Plate Co. has opened its books for first quarter at 2.25c., 3c. and 4c. for blue annealed, black and galvanized respectively. The price of tin plate is holding firmly, one indication of this being an offer made by a manufacturer in nearby territory to place a large order at \$4.50 per base box, which up to date has found no takers. The market on bars, shapes and plates is rather quiet, although an independent company booked 100 tons of tank plates at 1.60c., Pittsburgh. The steel for the tanks, recently let to the Warren City Boiler & Tank Works, for nine tanks for the Pure Oil Co., is understood to have gone to one of the larger independent mills. There is very little activity in the structural field. A blast furnace for the Hamilton Furnace Co. at Hamilton, Ohio, is up for estimates, and bids will be closed to-day for the Elks' Temple, which will take about 300 tons. Plant opera-

tions in this district will not materially change. The American Rolling Mill Co. will operate its East Side plant full time during the week and the Whitaker-Gleason Co. at Portsmouth, Ohio, will continue at about 40 per cent. The Ashland Iron & Mining Co., Ashland, Ky., is operating at 50 per cent of capacity and expects to continue for the remainder of the year. The plants of the Andrews Steel Co. and the Newport Rolling Mill Co. are still idle, as no settlement has yet been made regarding working conditions and wages to be paid.

Warehouse Business.—Local jobbers report a slowing up in business during the past week, due, no doubt, to the Thanksgiving holiday, as many plants were closed from Wednesday till Monday. There have been no further price changes and it is not expected that any will develop before the first of the year.

Iron and steel bars, 2.90c. base; hoops and bands, 3.50c. base; shapes and plates, 3c. base; reinforcing bars, 2.97½c. base; cold rolled rounds, 1½-in. and larger, 3.70c.; under 1½-in. and flats, squares and hexagons, 4.20c.; No. 10 blue annealed sheets, 3.60c.; No. 28 black sheets, 4.25c.; No. 28 galvanized sheets, 5c.; wire nails, \$3.25 per keg base; No. 9 annealed wire, \$3 per 100 lb.

Coke.—The coke market is exceedingly dull, so much so that a number of West Virginia operators are considering closing down their ovens on Dec. 1. There have been no market changes in prices, although foundry coke from the Wise County district is off 25c. a ton as compared with a week ago. Connellsville and New River prices are unchanged.

Old Material.—Local dealers report the scrap market as practically at a standstill. There have been no sales of consequence, and consumers are holding up shipments on contracts. This condition is also noticeable from other districts. Dealers report a scarcity of iron rails and axles. Some quotations have been reduced, but in the absence of sales, prices are practically the same as a week ago.

We quote dealers' buying prices, f.o.b. cars:

Per Gross Ton		
Bundled sheets.....	\$4.00 to	\$4.50
Iron rails.....	12.50 to	13.00
Relaying rails, 50 lb. and up.....	25.50 to	26.50
Rerolling steel rails.....	11.00 to	12.00
Heavy melting steel.....	9.50 to	10.00
Steel rails for melting.....	9.50 to	10.00
Car wheels.....	12.50 to	13.50

Per Net Ton		
No. 1 railroad wrought.....	9.00 to	10.00
Cast borings.....	3.50 to	4.00
Steel turnings.....	2.50 to	3.00
Railroad cast.....	12.50 to	13.00
No. 1 machinery.....	14.00 to	15.00
Burnt scrap.....	8.00 to	9.00
Iron axles.....	16.00 to	17.00
Locomotive tires (smooth inside).....	10.00 to	10.50
Pipes and flues.....	4.50 to	5.00

San Francisco

SAN FRANCISCO, Nov. 23.

Pig Iron.—The Coast market continues quiet, as far as actual sales are concerned. Foundries and manufacturers are taking for their immediate requirements, for the most part, which at present are nothing more than of a routine nature. During the past week or ten days one large handler reported having sold approximately 500 tons, but none in any considerable quantity. The price was in the neighborhood of \$27.50, ex ship. Foreign material is quite freely offered, in some cases around \$25 to \$26. Under prevailing conditions, however, interest is small.

Cast-Iron Pipe.—An improvement in private business is reported by the larger interests, chiefly in northern California, but municipal work remains light. The city of Sacramento closes bids on Dec. 1 for 42 tons of 6-in. pipe. Pasadena has received bids for 330 tons of 4-6-8-in. pipe, 100 tons of 12-in. and 12 tons of fittings. Alhambra was in the market for 45 tons of 4-6 and 12-in. pipe. The market price is about steady at \$33, base.

Finished Iron and Steel.—A gradual broadening of interest in steel products, covering a wider range of materials, appears to be the most encouraging feature of this market, which is rather quiet and unsettled at the moment. There have been sporadic inquiries from the mines, cement mills, tool shops and oil well supply companies, which are considered as indicative of this broadening interest. Heretofore plates, bars, sheets

and tin plate have offered the major interest, and it is notable that demand for these lines is light at present, particularly in the case of reinforcing bars, indicating the still prevalent tendency for builders to refrain from new construction work on a large scale. The principal inquiries during the fortnight seem to be one for about 10,000 lb. of forged steel balls and a smaller quantity of cast iron balls from a large Coast cement company; 80,000 lb. of 6-in. squares for drill stems from the Union Tool Co., and an inquiry from a Southern street railway for special work. A better demand is also reported for alloy steels. Plates and sheets continue in a very much unsettled condition and 3.75c. appears to be the highest basis at which galvanized sheets will move, but even at this figure business is light. The question of a reduced freight rate and the lateness of the season are considerations tending to limit buying. There is a rumor current of an inquiry for about 5000 tons of plates from Honolulu coming up soon.

Coke.—The Southern Pacific Co. has just closed for 600 tons of domestic coke at what is described as an exceptionally low price. Foreign coke continues to offer in good quantity, and in the past two weeks about 2000 tons have been distributed among the foundry trade. This English material brought around \$20, ex ship, San Francisco. Local smelters are still bringing in coke for their own use. While business cannot be called active, there is, however, a better demand for coke at this time, especially from the sanitary manufacturing trade.

Old Material.—A steady business is being done in scrap, especially cast iron material, several moderate-sized sales of which were reported at the prevailing price of about \$20, even slightly higher, in one case. It is estimated that approximately 2000 tons of scrap is moving weekly at the present time. Heavy melting steel is rather less in demand at the \$10 level.

Lake Superior Ore Shipments

CLEVELAND, Nov. 29.—The iron ore movement by water from the Lake Superior district for the present season, which closed Monday, was 22,300,726 gross tons, the smallest movement since 1904, when shipments by water were 21,226,591 tons. The 1921 movement shows a decrease of 61.89 per cent, or 36,226,500 tons from last year, when water shipments amounted to 58,527,226 tons. The high record was in 1916, when the shipments by water amounted to 64,734,198 tons.

The following table gives the season's shipments by ports and the corresponding figures for 1920 in gross tons:

	Season 1921	Season 1920
Escanaba	1,806,656	7,361,070
Marquette	786,946	3,415,108
Ashland	2,264,705	8,180,852
Superior	4,991,278	14,812,398
Duluth	9,164,803	15,479,334
Two Harbors	3,286,338	9,278,464
Total	22,300,726	58,527,226
1921 loss	36,226,500	

December meetings of the Chicago section, and of the Philadelphia section, of the Association of Iron and Steel Electrical Engineers are announced. In Chicago, Dec. 16, W. S. Hall, in a joint meeting with the Western Society of Engineers, will discuss "Electricity in Steel Mills." In Philadelphia, Dec. 20, in a joint meeting with the Engineers' Club and the American Society of Mechanical Engineers, D. M. Petty, electrical superintendent Lehigh plant, Bethlehem Steel Co., Bethlehem, Pa., will talk on "Yard Electrification of Industrial Plant Railways."

The Milwaukee Rolling Mill Co., Milwaukee, which started production in its new sheet mills on April 19, 1921, has increased its schedules to capacity operation to fill orders for black, blue annealed and galvanized sheets from manufacturers of enameled ware, utensils, building supplies, automobile bodies, and stampings of all descriptions. All of the eight mills are working 24 hr. a day in three 8-hr. shifts, with a force of 500 to 550 hands. Boyd B. Jack is general manager.

Philadelphia

PHILADELPHIA, Nov. 29.

December usually is a dull month in the iron and steel business, and present indications are that the coming month will prove no exception. In fact, the slump in buying has anticipated the beginning of December by at least two weeks. Business in the last week has been only a small fraction of that which was being booked during October. In the pig iron trade, there is a degree of optimism that a buying movement for first quarter may be expected in two or three weeks, very little iron having yet been purchased for that period. In the steel trade, however, there is a feeling that the present quiet conditions may be experienced until January or possibly until February.

Pig Iron.—The foundry iron market is somewhat easier, due both to lack of demand and to the active solicitation of business by furnaces which have just gone into blast or are making plans to do so. Sales have been made within the past week at \$20.50 to \$21, furnace, for No. 2 plain, and at \$21.50 to \$22.50 for No. 2X. The minimum prices represent a concession of about 50c. a ton. Present buying is confined to small lots—from a carload up to 100 or 150 tons—but a better buying movement for first quarter is expected to develop within two or three weeks. Practically no iron has been sold for that period and it is known that the stocks of many consumers will have been worked off by the end of the year, though deliveries on a few contracts for fourth quarter will run over into January. The largest inquiry in the market is for 7000 tons of basic for the Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa. Other Eastern steel makers are expected to buy shortly. In foundry iron the principal inquiry is from the Pennsylvania Railroad for about 2000 tons. The Baltimore & Ohio is inquiring for 400 tons.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to \$1.54 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$21.34 to \$22.04
East. Pa. No. 2X, 2.25 to 2.75 sil.	22.34 to 23.04
Virginia No. 2 plain, 1.75 to 2.25 sil.	27.74 to 28.74
Virginia No. 2X, 2.25 to 2.75 sil.	28.24 to 29.74
Basic deliv. eastern Pa.	21.00 to 21.50
Gray forge	22.50 to 23.00
Malleable	24.00 to 25.00
Standard low phos. (f.o.b. furnace)	36.50
Copper bearing low phos. (f.o.b. furnace)	35.00

Ferroalloys.—Domestic producers of ferromanganese continue strong in their quotations of \$58.35, seaboard, which is also the British price. Occasional cargoes are being sold. There is no demand for spiegeleisen, which is nominally quoted at \$25 to \$27, furnace. The Sheridan furnace of the Lavino Furnace Co. will be put in blast on ferromanganese about Dec. 15.

Billets.—Open-hearth rerolling billets are quoted at \$28 to \$29, Pittsburgh, and forging billets at \$33 to \$34, Pittsburgh.

Rails.—Bids will be opened Dec. 1 by the Norfolk & Western Railroad on 40,000 tons of heavy rails for 1922 delivery. No inquiries have been issued by the Pennsylvania and Philadelphia & Reading, but they are expected to come into the market soon.

Plates.—The inquiry of the Merchant Shipbuilding Corporation, Chester, Pa., for 10,000 tons of plates for fabricating pipe for the Catskill aqueduct, New York, will probably be issued soon. The shipbuilding company will fabricate the pipe for the Frederick Snare Corporation, New York, which has been awarded the general contract for a part of the construction work. A few good-sized inquiries for plates have been received from tank manufacturers, who are figuring on oil tank work. As a whole, however, the market is dull and prices are soft. On ordinary lots, 1.50c., Pittsburgh, is freely quoted and on more desirable tonnages this price has been shaded at least \$1 a ton and even \$2 concessions have been reported.

Structural Shapes.—Demand has fallen off decidedly in the past two weeks. There are fewer large projects to bring out sharp price competition. The market is

quotable at 1.50c., Pittsburgh, though this price has been shaded to 1.45c. in some instances.

Bars.—Orders for steel bars have diminished considerably. Jobbers are not replenishing stock, preferring to work down their inventories toward the year end. Prices continue as recently quoted, 1.50c. to 1.60c., Pittsburgh, depending on the size and character of the rolling. Bar iron is nominal at 1.60c., Pittsburgh, there being so little business that this price has not been tested.

Sheets.—The announcement of the American Sheet & Tin Plate Co. that its prices are 2.25c. on black annealed, 3c. on black and 4c. on galvanized, base, Pittsburgh, has tended to stabilize the market to some extent, though prior to this announcement there had been considerable shading of the 3c. and 4c. prices on black and galvanized sheets.

Bolts, Nuts and Rivets.—Prices are weak. Large size machine bolts are now freely quoted at 70 and 10 per cent off list, with other bolt discounts in proportion. Button-head rivets have been quoted as low as 2.10c., Pittsburgh. Nuts have been sold recently in this district at 5.60c. off list. About 500 tons of rivets will be required by the Merchant Shipbuilding Corporation for fabrication of pipe for the Catskill aqueduct, New York.

Warehouse Business.—A slowly increasing demand for steel out of jobbers' stocks is reported. Prices have not been changed within the past week. We quote for Philadelphia delivery as follows:

Soft steel bars and small shapes, 2.65c.; iron bars (except bands), 2.50c.; round edge iron, 2.80c.; round edge steel, iron finish, 1½ x ½ in., 2.95c.; round edge steel planished, 3.70c.; tank steel plates, ¼-in. and heavier, 2.75c.; tank steel plates, 3/16-in., 2.925c.; blue annealed steel sheets, No. 10 gage, 3.50c.; light black sheets, No. 28 gage, 4c.; galvanized sheets, No. 28 gage, 5c.; square twisted and deformed steel bars, 2.65c.; structural shapes, 2.60c.; diamond pattern plates, ¼-in., 4.60c.; 3/16-in., 4.785c.; ½-in., 4.90c.; spring steel, 4.10c.; round cold-rolled steel, 3.50c.; squares and hexagons, cold-rolled steel, 4c.; steel hoops, No. 13 gage and lighter, 3.50c.; steel bands, No. 12 gage to 3/16-in., inclusive, 3.25c.; iron bands, 3.90c.; rails, 2.75c.; tool steel, 8c.; Norway iron, 5c.; toe steel, 4.50c.

Old Material.—Prices are lower on many grades of scrap. An Eastern consumer last week bought 200 tons of No. 1 heavy melting steel at \$11.50, delivered. Another paid \$12, and a third consumer is offering \$12.50. Cast iron borings is one grade that remains fairly firm. Sales have been made within the past few days at \$12, delivered. We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel.....	\$11.50 to \$12.50
Scrap rail	11.50 to 12.50
Steel rails, rerolling.....	16.50 to 17.00
No. 1 low phos., heavy 0.04 and under.....	17.00 to 18.00
Car wheels	17.00 to 17.50
No. 1 railroad wrought.....	15.50 to 16.00
No. 1 yard wrought.....	13.00 to 13.50
No. 1 forge fire.....	10.00 to 10.50
Bundled sheets (for steel works).....	10.00 to 10.50
No. 1 busheling.....	12.00 to 13.00
No. 2 busheling.....	10.00 to 11.00
Turnings (short shoveling grade for blast furnace use).....	9.00 to 9.50
Mixed borings and turnings (for blast furnace use)	9.00 to 9.50
Machine-shop turnings (for rolling mill and steel works use).....	9.00 to 9.50
Heavy axle turnings (or equivalent).....	10.00 to 10.50
Cast borings (for rolling mills).....	11.50 to 12.00
Cast borings (for steel mills).....	11.00 to 12.00
Cast borings (for chemical plants).....	12.00 to 12.50
No. 1 cast.....	17.50 to 18.00
Railroad grate bars.....	14.00 to 14.50
Stove plate (for steel plant use).....	14.00 to 14.50
Railroad malleable	14.00 to 14.50
Wrought iron and soft steel pipes and tubes (new specifications).....	12.50 to 13.00
Iron car axles.....	No market
Steel car axles.....	No market

The results of railroad operations in October, as reported to date, have surprised rail officials themselves, the most optimistic of whom have not believed that the showing would equal that of last year, says the New York *Evening Post*. From the reports at hand, however, it would appear that October will prove to be the most profitable month for the carriers since the resumption of private operation. A compilation of the gross and net railway operating revenues of 15 of the principal lines shows a marked increase.

GERMAN PRICES SOARING

Labor Continues to Demand Return of Price Control—Belgium, Spain and Far East Buy

(Special Correspondence)

BERLIN, GERMANY, Nov. 13.—The readjustment of the so-called "guiding prices" recently fixed by the steel federation has not been long in coming. At a sitting of the price committee of the federation, a few days ago, a considerable increase of these guiding prices was decided upon. The following table shows the old and new guiding prices in marks per metric ton:

	Former Price	New Price
Ingots	2,425	3,300
Cogged blooms	2,655	3,600
Billets	2,725	3,700
Sheet bars	2,725	3,800
Structural shapes	3,150	4,400
Bar iron	3,200	4,500
Hoop iron	3,585	5,000
Sheets, No. 6, U. S. gage.....	3,500	5,100
Nos. 7 to 11.....	4,300	5,900
Nos. 12 to 20.....	4,400	6,150
No. 20	4,450	6,300
Wire rods	3,500	4,900

The above are base prices on basic material f.o.b. works, the surcharge for open hearth material being 300 m. per ton. An advance of coal prices will automatically increase these guiding prices by 3.50 m. per 1 m. of coal price increase.

The fixing of new guiding prices was rendered imperative by the heavy slump of the mark, which caused a soaring of ore and scrap quotations, but even these new prices may be obsolete by the time this report is published. The price committee has called another meeting for the end of November, when prices will probably be revised unless the trend of the mark should take a sudden turn for the better. It is pointed out by certain producers that the new prices are inadequate in view of the renewed depreciation of the mark. There is little to be said in opposition, considering that the best scrap sells at about 3330 m., the amount set as the guiding price for ingots.

There are still many mills which are sold up for several months ahead at the old prices and who have next to no interest in price advances, as the regulations and agreements preclude closing contracts on the sliding scale principle.

It is important to remember that the establishment of guiding prices was largely dictated by a desire to forestall the reintroduction of official maximum prices by the Government. It still remains to be seen whether this voluntary move by producers and trade will have the desired effect. The labor delegates of the Iron Control Federation have lodged another protest against the increase of guiding prices, repeating their demand for reintroduction of maximum prices. The Federal Minister of Economics has now ordered a new examination of producers' costs, the results to serve as a basis for further negotiations at the coming meeting of the inland committee. Thus there is still the possibility of a reintroduction of legal maximum prices.

The strike at the Gelsenkirchen blast furnaces has been settled and operations resumed. The loss in pig iron output is estimated at approximately 20,000 tons. Fresh strikes are, however, announced from the Dortmund Union and the Hösch steel works, where machinists have struck on a wages disagreement. Both works, as well as a part of the Phoenix plant at Hörde, are idle. A satisfactory agreement is expected. This dispute is causing less apprehension than the strike at some of the largest lime works in the Rhenish-Westphalian district which, unless speedily settled, threatens to render the position of blast furnaces and steel works precarious, as shipments of lime have practically come to a standstill.

Foreign inquiries and orders are still brisk and are gaining in volume lately. A feature of the market during the past week was the strong demand from Belgium, which German circles are inclined to account for by a pressure on mills similar to that in Germany. Spain is also in the market for fairly large quantities, and substantial orders have been received from the Far East, though a limited percentage only was accepted.

A noteworthy feature has been the heavy foreign demand for pig iron.

For once the heavy drop of the mark during the past week failed to have a corresponding effect on market prices, excepting perhaps light plates, which

were quoted higher. Quotations were at about the previous week's level but fluctuated to an extraordinary extent. The tone of the market was rather erratic and such prices as were heard could not be regarded as indicative of the trend.

British Iron and Steel Market

Improvement in Finished Steel Gradual—Continental Delivery Delays Troublesome—Tin Plate Market Steady

(By Cable)

LONDON, ENGLAND, Nov. 29.

Pig iron price reductions are anticipated for early December. Hematite producers are pressing sales and accepting lower prices. Foreign ore is stagnant. The best Bilbao Rubio is quoted at 26s. (\$5.17) ex-ship.

Steel improvement is gradual. The works are receiving more orders, but the plants are still only partly employed. There is some export inquiry.

Continental delays in deliveries are causing trouble. French merchant bars are being done at £7 17s. (1.39c. per lb.) f.o.b. French beams are offered below £8 (1.42c. per lb.) f.o.b.

German 3/16-in. plates have been sold at £7 5s. (1.29c. per lb.) f.o.b. for January shipment. German merchant bars are quoted at £7 15s. (1.38c. per lb.) f.o.b. for January and February shipment. German wire nails are quoted at 24½s. (\$4.88) to 24¾s. (\$4.93) c.i.f. Japan.

Belgian beams are being offered at £7 17½s. (1.40c. per lb.) f.o.b. Czecho-Slovakian merchant bars are being done at £8 to £8 2½s. (1.42c. to 1.44c. per lb.) f.o.b.

Tin plates are steady on good home buying of odd sizes and option contracts for forward deliveries. For December delivery, 21¼s. (\$4.23) basis is being paid. Near East demand for wasters continues; buyers of quarters up to 20¼s. (\$4.03) f.o.b.; sellers 20½s. (\$4.08) f.o.b.

Cheap sellers of Welsh steel are less heard of. Galvanized sheets are easier.

We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at \$3.98 per £1 as follows:

Durham coke, delivered....	£1 10	\$5.97
Cleveland No. 1 foundry....	5 15	22.88
Cleveland No. 3 foundry....	5 10	21.89
Cleveland No. 4 foundry....	5 5	20.89
Cleveland No. 4 forge....	5 0	19.90
Hematite	7 0*	27.86
East Coast mixed	5 10	21.89
Ferromanganese	15 0 & 14 10*	59.70 & 57.71
Rolls, 60 lb. and up....	9 0 to 10 10	35.82 to 41.79
Billets	7 5 to 8 5	28.86 to 32.84
Sheet and tin plate bars, Welsh	7 10 to 7 15	29.85 to 30.85
Tin plate base box....	1 1 to 1 2½	4.18 to 4.48
		C. per Lb.
Ship plates	10 10	1.866
Boiler plates	15 0 to 16 0	2.67 to 2.84
Tees	10 15 to 11 10	1.91 to 2.04
Channels	10 0 to 10 15	1.78 to 1.91
Beams	10 0 to 10 10	1.78 to 1.87
Round bars, ¾ to 3 in....	11 10 to 12 0	2.04 to 2.13
Galvanized sheets, 24 g....	17 10 to 18 0	3.11 to 3.20
Black sheets	14 10 to 15 0	2.57 to 2.67
Steel hoops	12 0 & 12 5*	2.13 & 2.18
Cold rolled steel strip, 20 g....	24 10	4.35

*Export price.

Galvanized Sheets and Tin Plates More Active—Large Stocks of High-Speed Steel

LONDON, ENGLAND, Nov. 18.—The first reflection of the Washington naval disarmament proposals, so far as the iron and steel market here was concerned, was to bring about a sharp fall in the price of armament shares which had been boosted up on the placing, just before the British delegates sailed for America, of orders for four super-ships at a cost of £36,000,000. It had been generally felt that this presaged British determination to force competition in shipbuilding for war purposes. The apparent approval of America's

proposals at Washington was therefore the more surprising to the armament firms on this side. The general mass of the people, however, heartily welcome any proposals likely to bring about a return to world-wide sanity.

In a general way, there is very little new in the market situation. Here and there furnaces and mills are drifting back to work, but the only semblance of activity apparent so far, is in the galvanized sheet and tin plate trades, in both of which a great deal of booking has been done within the last few months, although even here there has been a disposition just lately to trade with caution. Prices have come down considerably now from their mid-summer level, which means that British works are in a better position to compete with those on the continent, especially as deliveries from the latter are getting seriously behind-hand, while the depreciation in exchanges constitutes a formidable stumbling block to international intercourse.

A point of interest is that the government seems to have discovered a stock of about 2000 tons of high-speed and other crucible steel. The extent of this surplus gave the market quite a shock, and it remains to be seen how this total can be disposed of. Makers of high-speed tool steel hope that the quantities will be found so muddled and mixed that it will be impossible to sort them out except with the greatest trouble, in which event manufacturing operations may not be so seriously affected as would otherwise be the case. If, however, the material were marketed on definite analyses it is feared that the high-speed steel makers might have a bad time ahead.

As to markets in general, pig iron is weak, No. 3 Cleveland being officially quoted at 110s., but merchants are prepared to negotiate for 5s. less. Consumers take little interest except where forced to cover immediate requirements. Export business is quite stagnant. There was a little renewal of business in hematite for export a short time ago, but now this has been satisfied, nothing fresh seems to be coming forward. Makers are unable to get their current production entirely absorbed and therefore are more disposed to make concessions. East Coast mixed numbers are still quoted at 120s., but it is possible to do business at less.

In finished iron and steel, while there is a certain amount of business passing, the volume does not total anything like normal proportions and works here have still sufficient orders to carry them on part time for a short period. Prices officially are unchanged for the home trade, but in some instances lower figures have been taken to secure the business. Export prices are weak and for sections £9, f.o.b., has been freely quoted, which compares very favorably with continental works, in that deliveries from that side are liable to indefinite delay.

The General Electric Co., Pittsfield, Mass., which has been closed for inventory purposes, has now resumed operations. The company has received another large order for transformers, amounting to about \$250,000. A short time ago the company secured a slightly smaller order from Japan. The transformer department is much more active than the others, the motor department being particularly quiet. Operations for the plant are reported at about 25 per cent of normal.

The Cuban Collector will be published monthly by the American Protective & Credit Service Corporation, 23 Union Square, New York, beginning Dec. 15. The publication, which will be in the form of a bulletin, will describe in detail the prevailing conditions in Cuba, extracted from the daily cable reports of the corporation's adjusters. Names of those interested in Cuban conditions will be entered on the mailing list of the bulletin without charge.

BOOK REVIEWS

Walzen und Walzenkalibrieren. By Wilhelm Tafel, professor Technische Hochschule, Breslau. Pages 228, 6 x 9 in.; illustrations 161. Printed in German. Published by Verlag von Fr. Wilh. Ruhfus, Dortmund, Germany. Price \$2.25.

Professor Tafel's book is a lucid and clear treatise explaining the basic facts of the rolling process and analyzing the various factors of importance in the practice of grooving rolls; it is an introduction into the art and science of rolling. The practical man interested only in successful groove sketches will certainly be disappointed in the book because essential conceptions are dealt with in preference to empirical material, and rules are formulated to be applied, not examples to be followed; but the student willing to study and to digest the valuable information offered will not be disappointed, for his labor is bound to bear fruit. The work is an obvious attempt to raise the practice of rolling above the uncertainties of empiricism into the domain of scientific knowledge, and one cannot help but welcome these labor-involved pages that reflect the love of the teacher and the experience of the practical engineer that knows the mill.

Special attention is drawn to Professor Tafel's method of developing and calculating the sequence of grooves for irregular shapes. It leads to an astonishingly simple solution. His analysis of the problem of the mill drive is also noteworthy, explaining that the load factor is the crux of the controversy over the steam engine versus the electric motor. In his conclusions Professor Tafel is somewhat too unilateral, because electrification affects not the mill drives alone, but the whole plant. Worth considering are the new solutions, such as quick acting load regulators for turbines and novel type of control for transformer units to increase the efficiency of electrical drives.

The complete absence of literature on the rolling problem in the English language naturally leads to the suggestion that a translation of Professor Tafel's work would fill a real want. Amplification of the original text would be necessary on account of the numerous references to German books and technical articles not readily available to the American reader. The illustrations are rather poorly done and not up to standard—a small defect in the light of the excellency of the text.

J. F. S.

New Books Received

Fire Prevention and Fire Protection. By Joseph Kendall Freitag. Pages 1038, 4¼ x 7 in.; illustrations 395. Published by John Wiley & Sons, Inc., 432 Fourth Avenue, New York.

The Port of Portland, Me. Port Series No. 1. By the Statistical Division, Board of Engineers for Rivers and Harbors, War Department. Pages 64, 6 x 9 in.; maps and charts 10. Published by the Government Printing Office, Washington.

Trading With Asia. By Frank R. Eldridge, Jr., chief of the Far Eastern Division of the United States Bureau of Foreign and Domestic Commerce. Pages xxii + 474, 5¼ x 8¼ in. Published by D. Appleton & Co., 35 West Thirty-second Street, New York.

Waste in Industry. By the Committee on Elimination of Waste in Industry of the Federated American Engineering Societies. Pages 409, 6 x 9 in. Published by the Federated Engineering Societies, Washington, and for sale by the McGraw-Hill Book Co., 370 Seventh Avenue, New York.

Science and Common Sense in Working with Men. By Walter Dill Scott and M. H. S. Hayes. Pages ix + 154; 5 x 8 in. Published by the Ronald Press Co., 20 Vesey Street, New York. Price, \$2.

American Society for Testing Materials Tentative Standards. 1921 Edition. Pages 518, 6 x 9 in.; 127

tentative standards. Published by the society, 1815 Spruce Street, Philadelphia.

Time Study and Job Analysis. By William O. Lichten. Pages xvii+397, 6 x 9 in.; illustrations 81. Published by the Ronald Press Co., 20 Vesey Street, New York.

NEW TRADE PUBLICATIONS

Vacuum Pumps.—Chicago Pneumatic Tool Co., 6 East Forty-fourth Street, New York, Bulletin No. 710. Dry vacuum pumps, steam, belt and motor driven of duplex type for high vacuum service, duplex pumps for both low and high vacua; single-cylinder pumps for high vacuum service and single cylinder pumps for both low and high vacuums are described in detail. The illustrations include photographic reproductions and sectional views. Size 6 x 9 in., 20 pages.

Radial Wall Drill.—Pawling & Harnischfeger Co., Milwaukee, Wis., Bulletin No. 206. Devoted to the company's No. 6 radial wall drill for use on unusually large surfaces, such as structural shapes, boiler plates and long beams. The illustrations show the machine in use. Line drawings with dimensions and condensed specifications are given. Size 8½ x 11 in.

Automatic Screw Machinery and Their Products.—National Acme Co., Cleveland, Calendar. Size 12 x 15½ in. Each of the twelve leaves gives the calendar for one month beginning with November, each sheet having also the calendar for the month previous and following the current month. The upper half contains half-tone illustrations on a tinted background either of one of the company's automatic screw machines or some of its products or accessories.

Hoists.—The Chisholm-Moore Mfg. Co., Cleveland. Catalog No. 26, describes and illustrates the company's line of Cyclone high speed and other designs of chain hoists, trolley hoists, trolleys, switches, hand power traveling cranes, jib and other types of cranes, power winches, etc. The illustrations include interior views of plants showing installations of the company's line of equipment for various handling purposes.

Babbitt Metal.—Westinghouse Electric & Mfg. Co. folder 4474 bears the title, "Lead Base Babbitt Metal." The subjects discussed in this publication are overheating, bearing design, preliminary machining of shells, cleaning of shells, care of tinning alloy, tinning of bronze shells, tinning of pipe and malleable iron bearing shells, anchor holes in cast iron bearing shells, care of babbit metal, cleaning solutions and materials.

Cranes.—Whiting Corporation, Harvey, Ill. Catalog No. 158. Describes and illustrates the company's line of electric traveling cranes, with details as to crane bridges, bridge trucks, operator's cages and other components. A section is devoted to electric crane trolleys of various types and the company's double-stop limit switch, mechanical brake and electric solenoid brakes are described. Bucket, gantry, transfer, handpower, jib, pillar cranes and other types are included. The illustrations show details of construction and views of cranes in service. Supersedes catalog No. 151. Size 6 x 9 in., 80 pages.

Seamless Steel Tubing.—National Tube Co., Pittsburgh. Bulletin No. 17B, third edition 8½ x 11 in., 28 pages. Devoted to the mechanical and structural uses of Shelby steel tubing, taking up the properties and general characteristics; use in place of solid stock or forgings; range of sizes, wall thicknesses and weights; steels used; anneals and special shapes. The special operations that the company can perform on Shelby mechanical tubing are outlined and illustrated by line drawings. The forming and machining as performed by manufacturing consumers is described and illustrated. A chapter is devoted to the use of seamless tubing for specific purposes, such as axle construction, frames and fixtures, engine and boiler tubing, etc. The bulletin is concluded with a list of several hundred uses of the material.

Continuous Milling Machines.—Ingersoll Milling Machine Co., Rockford, Ill. Bulletin No. 41, size 8½ x 11 in., 23 pages. Several sizes of machines of the drum type and typical work done by them are illustrated and described. A section is devoted to face milling cutters, helical tooth channeling cutters and inserted tooth profile cutters of the company's manufacture. A section is also devoted to Ingersoll milling fixtures.

IRON AND INDUSTRIAL STOCKS

Hesitancy in General Upward Movement is Largely Dissipated

The hesitancy prevailing a week ago in the general tendency of iron and industrial securities is largely dissipated, although natural moderate setbacks occasionally come in individual cases. Leadership in the upswing has shifted from the steel to the railroad securities, mainly for two reasons. First, investors are counting on Congress soon taking favorable action on the railroad funding bill, and second, they find railroad shares entirely out of line with bond values. The relation of the railroad funding bill to railroad purchases is largely discounted by the advance in equipment shares already noted. But better business prospect as related to industry in general is not discounted in share values, which accounts for renewed investment buying of such stocks. Among investors an actual shortage of many kinds of merchandise is believed to exist. This shortage is not as manifest during the present curtailed buying period as it will be later. Recent buying of copper mining shares is now explained by the upward tendency of the red metal, which is now higher than it has been before in more than a year.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

Allis-Chalm. com. 35% - 36 1/2	Int. Har. pf. 100% - 103
Allis-Chalm. pf. 83 - 84	Lackawanna Steel. 41% - 43 1/4
Am. Can. com. 30 1/2 - 32 1/4	Midvale Steel. 23% - 25 1/2
Am. Can. pf. 87% - 89 1/2	Nat.-Acme 12% - 12 1/2
Am. C. & F. com. 137 - 142	Nat. E. & S. com. 39 - 43
Am. C. & F. pf. 115 - 115 1/2	N. Y. Air Brake. 55 - 59
Am. Loco. com. 93 1/4 - 95	Nova Scotia Steel. 21% - 27
Am. Loco. pf. - 110	Press. Steel com. 61 1/4 - 65
Am. Radiator com. 84% - 90 1/2	Ry. Stl. Spg. com. 88 - 90
Am. Steel F. com. 31 - 32 1/2	Ry. Stl. Spg. pf. 105 - 107
Am. Steel F. pf. 91 1/2 - 92	Replogle Steel. 21 1/4 - 24 1/2
Bald. Loco. com. 94% - 97 1/2	Republic com. 48% - 51
Bald. Loco. pf. 104 - 104 1/2	Republic pf. 85 - 86
Beth. Steel com. 51% - 53	Sloss com. 38 - 40%
Beth. Stl. Cl. B. 54 1/2 - 56 1/4	Superior Steel. 30 - 32
Beth. Stl. 8% pf. 102 - 104	Transue-Williams. 32 - 33 1/2
Chic. Pneu. Tool. 51 - 53	Un. Alloy Steel. 25% - 26
Colorado Fuel. 24 1/2 - 25	U. S. Pipe com. 14% - 18
Cruc. Steel com. 63 1/4 - 66 1/2	U. S. Pipe pf. 47 - 57
Cruc. Steel pf. 86 - 90 1/4	U. S. Steel com. 82 1/2 - 83 1/2
General Electric. 133 1/4 - 137 1/2	U. S. Steel pf. 112 - 112 1/2
Gt. No. Ore Cert. 33 1/2 - 35%	Vanadium Steel. 30 1/4 - 32 1/2
Gulf States Steel. 39 - 50 1/2	Westingh's Elec. 46% - 48 1/4
Int. Har. com. 75 1/4 - 78 1/4	

May Be Due to Merger Talk

Reflecting credence accorded independent steel merger reports centering about the Youngstown Sheet & Tube Co., Youngstown, Ohio, is the fact that a small block of its common stock sold recently at \$70, as compared with a market price of \$52 to \$54, which prevailed for several months prior to the amalgamation rumors. This represents an advance of \$25 from the extreme low. Common stock of the Inland Steel Co., also frequently mentioned in connection with the merger reports, was quoted early this week in Chicago at \$51 bid and \$53 asked. Previous to merger talk, this stock was selling around \$35. Equity for the common stock of both companies is placed considerably higher by them than current market values.

Youngstown Company Will Expand

To provide funds for expansion, the Commercial Shearing & Stamping Co., Youngstown, Ohio, is offering 16,000 shares of cumulative, convertible preferred stock, par value \$25. The company now has outstanding \$366,915 of common stock. A new charter which it has secured provides for 33,500 shares of non par value common, of which 16,000 shares are set aside for conversion of the preferred. The remaining 17,500 shares will be used in retiring the present common issue.

President Robert Carnick states that the present plant has a yearly capacity of 12,000 tons of sheared and stamped steel products, the principal items of which are plates, sheets, circles, flat blanks, boiler heads and automobile and agricultural implement stampings.

Through the new financing plan, which will produce about \$400,000 of additional capital, the company will more than double its capacity of sheared plate production; will enlarge its pressed steel output by 300 per cent and will be placed in position to move a volume of direct mill business in excess of 300 per cent of present brokerage sales. This will permit in gross business, sales in excess of \$3,000,000 annually it is claimed.

The company says its plant is the largest of its kind in the country devoted to shearing and fabricating plates into unit sizes. It furnishes manufacturers throughout the country with sheets and plates for their special requirements,

while its pressed steel department supplies much material for the automobile and agricultural implement trades.

Plate ends are largely purchased from the Brier Hill Steel Co., Youngstown, under a special contract arrangement.

Industrial Finances

The United States District Court, Trenton, N. J., has appointed three receivers for the Willys Corporation, Elizabeth, N. J., manufacturer of automobiles, each to serve under bond of \$50,000. The appointees are Clifford I. Voorhees, New Brunswick, N. J.; Frank P. Kennison, president of the Ohio Savings Bank & Trust Co., Toledo; and C. O. Miniger, head of the Electric Auto-Light Co., of the last noted city. Judgments for \$200,000, representing 44 creditors, have been secured against the company.

Judge Knox, Federal District Court, New York, has appointed John B. Johnston and John E. Worley, receivers for the Habirshaw Electric Cable Co., 10 East Forty-third Street, New York, with joint bond of \$25,000. The Electric Cable Co., and the Bare Wire Co., operated under the same management, are also subject to the receivership. The total liabilities are said to aggregate \$5,000,000, and assets, \$7,000,000.

Appraisers have been appointed for the Lincoln Motor Company, of Detroit. The Detroit Trust Co., receiver, is keeping the working organization intact. Production is still being maintained and some shipments of cars are being made.

The American Tool Co., Meriden, Conn. has filed a preliminary certificate of dissolution with the state authorities.

According to a statement filed by the B. F. Sturtevant Co., Hyde Park, Boston, blowers, with the Massachusetts commissioner of corporations, the total assets and liabilities as of June 30, last, amounted to \$5,947,401, as compared with \$6,610,962 at the close of the previous year, a decrease of \$663,561. The surplus at the close of the year was \$1,339,466, contrasted with \$1,147,427 on June 30, 1920, an increase of \$192,040.

The income account of the Colorado Fuel & Iron Co. for the quarter ended Sept. 30, last, shows gross receipts were \$5,569,147, contrasted with \$13,484,393 for the corresponding period last year, a decrease of \$7,915,246. Operating expenses were \$6,792,834 less than those for last year, yet net earnings dropped to \$138,905, a decrease of \$1,123,412. After interest, taxes, depreciation and other charges, a deficit of \$810,868 is shown, as against a surplus of \$907,376 for the same period last year. During the first nine months of the year the company showed an operating loss of \$579,094, whereas last year it had a surplus of \$1,890,515.

The American Metal Parts Corporation, 28 Brighton Ave., Brighton, Boston, has notified the state authorities of its intention of increasing its preferred stock capitalization to \$200,000, and the common to 3500 shares, to be disposed of from time to time. Joseph Bornstein is president, and Arthur H. Doble, treasurer.

Directors of the Eastern Machine Works, Revere, Mass., have authorized an increase in the capitalization from \$10,000 to \$100,000, or 9000 shares, par \$10. The additional stock is to be issued for a license to operate. Joseph A. Guay is president, and Leonard A. Dunn, treasurer.

The Bethlehem Steel Corporation has called for redemption on Jan. 15, next, \$7,500,000 secured serial 7 per cent notes, series D, at par and accrued interest. These notes were to run until July 5, 1922. The right to convert them into consolidated mortgage 30-year sinking fund 6 per cent bonds expires Jan. 16.

A special meeting of shareholders of the Bessemer Limestone & Cement Co., Youngstown, Ohio, has been called for Dec. 16 to take action on the recommendation of directors authorizing an increase of \$1,000,000 in the common capitalization and an issue of \$750,000 8 per cent, five-year convertible notes. The proceeds will be devoted to making final payment on the cost of the company's new cement plant at Bessemer, Pa.; to pay for construction of a railroad connection, and for other betterments.

The Exeter Machine Works, Inc., West Pittston, Pa., has appointed Buckmaster-Luck-Malochie, Inc., New Orleans, exclusive sales agents for the Exeter rotary pump line in the New Orleans district. The Reeves & Skinner Machinery Co., St. Louis, has been appointed exclusive sales agent in the St. Louis district.

The Rivett Lathe & Grinder Co., Brighton district, Boston, recently opened a sales office in Detroit, located with the Reed-Prentice Co., 408 Kerr Building.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic...	\$0.35	Kansas City	\$0.815
Philadelphia, export...	0.265	Kansas City (pipe)...	0.77
Baltimore, domestic...	0.335	St. Paul	0.665
Baltimore, export	0.255	Omaha	0.815
New York, domestic...	0.38	Omaha (pipe)	0.77
New York, export...	0.285	Denver	1.35
Boston, domestic	0.415	Denver (wire products) ..	1.415
Boston, export	0.285	Pacific Coast	1.665
Buffalo	0.295	Pacific Coast, ship plates ..	1.335
Cleveland	0.24	Birmingham	0.765
Detroit	0.325	Jacksonville, all rail...	0.555
Cincinnati	0.325	Jacksonville, rail and	
Indianapolis	0.345	water	0.46
Chicago	0.38	New Orleans	0.515
St. Louis	0.475		

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, \$1; wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2 1/2 c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, 1/4 in. thick and over, and zees, structural sizes, 1.50c. to 1.60c.

Sheared plates, 1/4 in. and heavier, tank quality, 1.50c. to 1.60c.

Wire Products

Wire nails, \$2.75 to \$2.90 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$1.25 and shorter than 1 in., \$1.75; bright Bessemer and basic wire, \$2.50 to \$2.60 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.50 to \$2.60; galvanized wire, \$2.95 to \$3.10; galvanized barbed wire, \$3.40 to \$3.55; galvanized fence staples, \$3.40 to \$3.55; painted barbed wire, \$2.90 to \$3.05; polished fence staples, \$2.90 to \$3.05; cement-coated nails, per count keg, \$2.35 to \$2.45; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 68 to 70 1/2 per cent off list for carload lots, 67 to 69 1/2 per cent for 1000-rod lots, and 66 to 68 1/2 per cent for small lots, f.o.b. Pittsburgh.

Bolts, Nuts and Rivets

Large structural and ship rivets.....\$2.25 to \$2.40 base
Large boiler rivets.....2.35 to 2.50 base
Small rivets70, 10 and 5 to 70, 10 and 10 per cent off list
Machine bolts, small, rolled threads.....
70, 10 and 5 to 70, 10 and 7 1/2 per cent off list
Machine bolts, small, cut threads.....
70 and 5 to 70 and 10 per cent off list
Machine bolts, larger and longer.....
65, 10 and 5 to 70 and 10 per cent off list
Carriage bolts, 3/4 in. x 6 in.:
Smaller and shorter rolled threads.....
65, 10 and 10 per cent off list
Cut threads65 and 10 to 70 per cent off list
Longer and larger sizes.....65 and 10 to 70 per cent off list
Lag bolts70 and 10 to 70, 10 and 5 per cent off list
Pilot bolts, Nos. 1, 2 and 3 heads.....60 and 10 per cent off list
Other style heads.....20 per cent extra
Machine bolts, c.p.c. and t. nuts, 3/4 in. x 4 in.:
Smaller and shorter.....65 and 5 per cent off list
Larger and longer sizes.....65 per cent off list
Hot pressed sq. or hex. blank nuts.....\$5.50 off list
Hot pressed nuts, tapped.....\$5.00 to \$5.25 off list
C.p.c. and t. sq. or hex. blank nuts.....\$5.25 off list
C.p.c. and t. sq. or hex. blank nuts, tapped.....\$5.00 off list
Semi-finished hex. nuts:
1/4 in. to 9/16 in. inclusive.....80, 10 and 10 per cent off list
Small sizes S. A. E.....80, 10, 10 and 10 per cent off list
3/4 in. to 1 in. inclusive, U. S. S. and S. A. E.....
70, 10, 10 and 10 per cent off list
Stove bolts in packages.....80, 10 and 5 per cent off list
Stove bolts in bulk.....80, 10 and 5 per cent off list
Tire bolts65, 10 and 10 per cent off list
Track bolts, carloads.....3.25c. to 3.50c. base
Track bolts, less than carloads.....4.25c. to 4.50c.

Upset Square and Hex. Head Cap Screws
1/4 in. and under.....75 and 10 to 80 and 10 per cent off list
9/16 in. to 3/4 in.....75 and 10 to 80 and 10 per cent off list

Upset Set Screws
1/4 in. and under.....80, 10 and 5 to 85 per cent off list
9/16 in. to 3/4 in.....80, 10 and 5 to 85 per cent off list

Milled Square and Hex. Cap Screws
All sizes70 and 10 per cent off list

Milled Set Screws
All sizes70, 10 and 5 per cent off list

Rivets

Rivets, 1c. per lb. extra for less than 200 kegs. Rivets in 100-lb. kegs, 25c. extra to buyers not under contract; small and miscellaneous lots less than two tons, 25c. extra; less than 100 lb. of a size or broken kegs, 50c. extra.

All prices carry standard extras f.o.b. Pittsburgh.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$40; chain rods, \$40; screw stock rods, \$45; rivet and bolt rods and other rods of that character, \$40; high carbon rods, \$48 to \$52, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16-in. and larger, \$2.25 base per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, 1/2-in., 3/4-in. and 7/16-in., \$2.40 to \$2.50 base; 5/16-in., \$2.40 to \$2.50 base. Boat and barge spikes, \$2.40 to \$2.50 base per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Track bolts, \$3.25 to \$3.50 base per 100 lb. Tie plates, \$2 per 100 lb. Angle bars, \$2.40 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., \$9.30 per package; 8-lb. coating, 1 C., \$9.60; 15-lb. coating, 1 C., \$11.80; 20-lb. coating, 1 C., \$13.00; 25-lb. coating, 1 C., \$14.25; 30-lb. coating, 1 C., \$15.25; 35-lb. coating, 1 C., \$16.25; 40-lb. coating, 1 C., \$17.25 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1.50c. to 1.60c. from mill. Refined bar iron, 2c. to 2.10c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Butt Weld			Iron		
Inches	Steel	Galv.	Inches	Black	Galv.
1/4 to 3/4	54 1/2	28	1/4 to 3/4	36 1/2	18 1/2
1/2 to 3/4	57 1/2	31	1/2 to 3/4	36 1/2	18 1/2
3/4 to 1	62 1/2	48	3/4 to 1	42 1/2	27 1/2
1 to 1 1/2	66 1/2	54	1 to 1 1/2	44 1/2	29 1/2
1 1/2 to 3	68 1/2	56			
2 to 3	61 1/2	49	Lap Weld		
2 1/2 to 6	65 1/2	53	2 to 3	39 1/2	25 1/2
7 to 8	62 1/2	49	2 1/2 to 6	42 1/2	29 1/2
9 to 12	61 1/2	48	7 to 12	40 1/2	27 1/2
Butt Weld, extra strong, plain ends					
1/4 to 3/4	50 1/2	33	1/4 to 3/4	41 1/2	37 1/2
1/2 to 3/4	53 1/2	35	1/2 to 3/4	35 1/2	28 1/2
3/4 to 1	59 1/2	48	3/4 to 1	42 1/2	28 1/2
1 to 1 1/2	64 1/2	53	1 to 1 1/2	44 1/2	30 1/2
1 1/2 to 3	66 1/2	55			
2 to 3	68 1/2	56			
			Lap Weld, extra strong, plain ends		
2 to 3	59 1/2	48	2 to 3	40 1/2	27 1/2
2 1/2 to 4	63 1/2	52	2 1/2 to 4	43 1/2	31 1/2
4 1/2 to 6	62 1/2	51	4 1/2 to 6	42 1/2	30 1/2
7 to 8	58 1/2	45	7 to 8	35 1/2	23 1/2
9 to 12	52 1/2	39	9 to 12	30 1/2	18 1/2

To the large jobbing trade the above discounts are increased by one point, with extra discounts of 5 and 2 1/2 per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh:

Lap Welded Steel		Charcoal Iron	
1 1/4 in.	26 1/2	1 1/4 in.	5
2 to 2 1/4 in.	41	1 1/2 to 1 3/4 in.	15
2 1/2 to 3 in.	52	2 to 2 1/4 in.	25
3 1/4 to 13 in.	57	2 1/2 to 3 in.	30
		3 1/4 to 4 1/2 in.	32

Standard Commercial Seamless Boiler Tubes

New discounts have been adopted on standard commercial seamless boiler tubes, but manufacturers are not yet ready to announce them for publication, and for that reason we publish no discounts this week.

Sheets

Prices for mill shipments on sheets of standard gage in carloads, f.o.b. Pittsburgh, follow:

Blue Annealed		Cents per Lb.	
No. 8 and heavier	2.20	Nos. 11 and 12	2.30
Nos. 9 and 10 (base)	2.25	Nos. 13 and 14	2.35
		Nos. 15 and 16	2.45
Box Annealed, One Pass Cold Rolled		Cents per Lb.	
Nos. 17 to 21	2.80	No. 28 (base)	3.00
Nos. 22 to 24	2.85	No. 29	3.10
Nos. 25 and 26	2.90	No. 30	3.20
No. 27	2.95		
Galvanized		Cents per Lb.	
Nos. 10 and 11	3.00	Nos. 25 and 26	3.70
Nos. 12 to 14	3.10	No. 27	3.85
Nos. 15 and 16	3.25	No. 28 (base)	4.00
Nos. 17 to 21	3.40	No. 29	4.25
Nos. 22 to 24	3.55	No. 30	4.50
Tin-Mill Black Plate		Cents per Lb.	
Nos. 15 and 16	2.80	No. 28 (base)	3.00
Nos. 17 to 21	2.85	No. 29	3.05
Nos. 22 to 24	2.90	No. 30	3.05
Nos. 25 to 27	2.95	Nos. 30 1/2 and 31	3.10

NON-FERROUS METALS

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York			Lead			Zinc	
	Lake	Electro-lytic	Tin New York	New York	St. Louis	New York	St. Louis	
Nov.								
23.....	13.50	13.37½	29.50	4.70	4.35	5.15	4.65	
25.....	13.50	13.37½	29.75	4.70	4.35	5.12½	4.62½	
26.....	13.50	13.37½	.....	4.70	4.35	5.12½	4.62½	
28.....	13.50	13.37½	30.00	4.70	4.35	5.15	4.65	
29.....	13.50	13.37½	29.87½	4.70	4.35	5.15	4.65	

New York

NEW YORK, Nov. 29.

The markets are generally quieter than a week ago, but the price tendency is firm to higher. As is usual the Thanksgiving holiday has caused some let-up in activity. The copper market is a little quieter but prices have slightly advanced for all positions. Extreme inactivity pervades the tin market after the recent heavy buying. There is no change in the lead situation. The zinc market continues dull with but slight changes in quotations.

Copper.—While the electrolytic copper market is generally characterized by sellers as a little quieter, inquiry, particularly for first quarter, continues, and buying for that position as well as for this year's delivery is satisfactory. Prices have stiffened in the last week until metal for delivery this year is at a minimum of 13.62½c., delivered, or 13.37½c., refinery, with many sellers out of the market for this position. It is stated that by shopping around probably small amounts could be obtained for December delivery at 12.50c., delivered, but as a market factor this is not regarded as important. For January and first quarter electrolytic copper is firmly quoted at 13.75c., delivered, or 13.50c., refinery, with some sellers asking ¼c. higher. Sales to foreign countries continue excellent with Germany a leading buyer this week as well as England. Lake copper is quiet and strong at 13.50c., delivered.

Tin.—Following the heavy sales of Straits tin reported a week ago, as reminiscent of old-time activity, the market has turned exceedingly quiet and practically no business is reported as done in the last two days. An influential factor in this dullness is the rise in the London market, particularly yesterday, of £2 per ton, as well as the strength of the pound sterling. This condition is said by one seller to have choked off buying completely. The quotation for spot Straits tin to-day was 29.87½c., New York, while the London market was £163 5s. for spot standard, £165 for future standard and £163 10s. per ton for spot Straits. Arrivals thus far this month have been 2505 tons with 3650 tons reported afloat.

Lead.—No change is reported in general conditions. Demand continues about equal to consumption and prices are firm in both markets. The leading interest continues to quote 4.70c., New York and St. Louis, while in the outside market the New York quotation is 4.70c. and the St. Louis 4.35c. The strength of the metal in London is attracting attention on this side. Quotations there have advanced from £24 15s. a week ago to £26 per ton to-day, and there is evidently a scarcity in Great Britain, due partly to a diminution of available supplies from Mexico and Spain, as well as from Australia. There is some prospect of export business from this country.

Zinc.—The market is virtually marking time with very little buying and but slight changes in quotations. Such buying as is reported is for immediate needs of galvanizers in particular and some other consumers, but it is limited. Consumers are evidently looking forward to the amount of stocks for inventory, keeping them as low as possible. The slight changes in quotations are due to the various views of a limited

number of sellers, most producers being largely out of the market for this year's delivery. Prime Western is therefore quoted for this year's delivery at 4.65c., St. Louis, or 5.15c., New York.

Antimony.—Wholesale lots for early delivery are quoted at 4.50c., New York, duty paid, with prompt metal at 4.55c.

Aluminum.—It became known only in the last few days that the leading interest had changed its quotation for virgin metal, 98 to 99 per cent pure, from 24.50c., f.o.b. plant, to 19c., for wholesale lots for early delivery. This change is stated to have taken place about Nov. 15, but it does not come as a surprise because it has been understood that this producer was meeting foreign competition for the same grade of metal from importers, which is obtainable from 17c. to 18c., New York, duty paid.

Old Metals.—The market is stronger and values are higher. Dealers' selling prices are nominally as follows:

	Cents Per Lb.
Copper, heavy and crucible.....	12.75
Copper, heavy and wire.....	11.75
Copper, light and bottoms.....	9.75
Heavy machine composition.....	10.00
Brass, heavy.....	7.75
Brass, light.....	6.00
No. 1 red brass or composition turnings.....	8.00
No. 1 yellow rod brass turnings.....	6.00
Lead, heavy.....	4.25
Lead, tea.....	3.25
Zinc.....	3.00

Chicago

Nov. 29.—The market has been quiet, no changes in prices have occurred except in tin which has advanced in sympathy with London. Old metal prices, which have remained unchanged for some time, have finally responded to the altered situation in the market for new material. Most grades of copper and brass have advanced while zinc has declined. We quote in carload lots: Lake copper, 13.25c. to 13.50c.; tin, 30.75c. to 31.25c.; lead, 4.45c.; spelter, 4.70c.; antimony, 6.50c., in less than carload lots. On old metals we quote: Copper wire, crucible shapes and copper clips, 9c.; copper bottoms, 7.25c.; red brass, 7.50c.; yellow brass, 5c.; lead pipe, 3c.; zinc, 2.12½c.; pewter, No. 1, 17c.; tin foil, 18c.; block tin, 20c.; all buying prices for less than carload lots.

St. Louis

ST. LOUIS, Nov. 29.—Both lead and zinc are weak. Lead is quoted at 4.25c., car lots, and zinc at 4.62½c. Lake copper is quoted at 13.73½c. to 14.48½c., car lots; tin, 30.73c. and antimony, 5.33½c. On old metals we quote: Light brass, 3.50c.; heavy red brass and light copper, 7c.; heavy yellow brass, 4c.; heavy copper and copper wire, 7.50c.; zinc, 2c.; pewter, 15c.; tin foil, 16c.; tea lead, 2c.; aluminum, 9c.

The Purchasing Agents' Association of Pittsburgh has elected the following officers: S. E. Van Vranken, Locomotive Stoker Co., president; J. E. Stauffer, A. M. Byers, Co., first vice-president; W. G. Scott, R. D. Nuttall Co., second vice-president; B. H. Vockrodt, Frick & Lindsey Co., third vice-president; H. L. Oberlin, Wm. B. Scaife & Sons Co., treasurer; F. T. Adams, secretary; G. W. Sanborn, United Engineering & Foundry Co., director for national association; H. B. Charles, McClintic-Marshall Co., J. B. Connelly, Mesta Machine Co., A. Davia, Dravo Contracting Co., and G. W. Sanborn, directors.

The Van Dorn Iron Works, Cleveland, has placed an order with the George J. Hagan Co., Pittsburgh, for an electric furnace for heat treating and carbonizing. This will be a standard furnace 12 ft. long, 3 ft. 9 in. wide and 1 ft. 11 in. high. It will be 123 kw. furnace, 220 to 440 volt, 3-phase, 60 cycle. The electric equipment will be supplied by the General Electric Co.

PERSONAL

E. A. Wheaton, formerly superintendent of open hearth department No. 3, Lehigh plant, Bethlehem Steel Corporation, has been promoted to the position of open hearth superintendent at its Maryland plant, Sparrows Point. He succeeds F. F. Lines, who resigned a short time ago. Mr. Wheaton was graduated from Lehigh University in 1912, and entered the employ of the Bethlehem Steel Corporation as a metallurgical engineer following his graduation. At the meeting of the American Iron and Steel Institute, October, 1920, he read a paper on "High Manganese Iron in Basic Open-Hearth Practice."



E. A. WHEATON

E. M. Freeland, formerly with the Sparrows Point, Md., plant, the Bethlehem Steel Corporation, has become affiliated with Follansbee Bros. Co., as metallurgist at the company's plant at Follansbee, W. Va.

Fred E. Holtz has been appointed representative in the Milwaukee district for the W. A. Jones Foundry & Machine Co., Chicago.

Frank H. Willard, vice-president Graton & Knight Mfg. Co., Worcester, Mass., belting, has returned from an extended European tour. He found the most serious business depression in Europe in the Scandinavian countries.

Charles H. John, 1119 State street, Milwaukee, has been elected trustee of the Northwestern Bridge & Iron Co., bankrupt, Milwaukee, Wis.

J. D. Ackenheil has joined the Heltzel Steel Form & Iron Co., Warren, Ohio, as field engineer in the Pittsburgh district. During four years' service previously with the Portland Cement Association he devoted considerable attention to the subject of steel forms from a construction standpoint.

A. G. Labbe has been elected president of the Wilamette Iron & Steel Works, Portland, Ore., succeeding Bert C. Ball, who will devote his time to other interests, chiefly to the Portland Vegetable Oil Mills Co. E. C. Pape, second vice-president, was advanced to first vice-president to succeed Mr. Labbe. N. H. Insley was chosen secretary and H. V. Carpenter treasurer.

W. H. Underwood, sales agent of the St. Louis Coke & Chemical Co., Boatmen's Bank Building, St. Louis, since that concern's Granite City, Ill., plant went into production in February, 1921, has been promoted to be sales manager. Mr. Underwood went to St. Louis from Chicago, where he had been manager for the Domhoff & Joyce Co.

H. M. Bush, 16 South Third street, Columbus, has been appointed sales representative for Central Ohio for standard punch and die sets manufactured by the Diamant Tool & Mfg. Co., Inc., Newark, N. J. Russell Propes, 1025 Cherry street, Norristown, Pa., has been appointed sales representative for southeastern Pennsylvania, including the Philadelphia section.

Hercules Smart, district sales manager in Detroit for the Illinois Tool Works, has been assigned to duties in the home office at Chicago. He is succeeded in Detroit by Gordon Stewart, who has been district representative in Indianapolis. The Detroit offices of the Illinois Tool Works are at 4835 Woodward Avenue.

O. E. Hunt, formerly with the Packard Motor Car Co., Hares Motors and, during the war, in charge of engineering in Detroit plants producing Liberty motors, has been made chief engineer of the Chevrolet Motor

Car Co., Flint, Mich., with supervision over engineering in all Chevrolet plants throughout the country.

R. L. Warburton, for a number of years with the Celite Products Co., has become identified with the Quigley Furnace Specialties Co., 26 Cortlandt Street, New York, as sales engineer. He has a wide knowledge of furnace design and the application of heat insulation.

President James A. Campbell, Youngstown Sheet & Tube Co., Youngstown, Ohio, is spending several weeks at Pinehurst, S. C., going there from the American Iron & Steel Institute meeting in New York. Walter E. Watson, assistant general sales manager of the sheet and tube company, has also been at Pinehurst.

W. J. Priestly, metallurgical engineer United States Naval Ordnance Plant, South Charleston, W. Va., has been chosen chairman of the Board of Registration for Engineers of West Virginia, the body set up by an act of the Legislature. George E. Taylor, Anderson & Taylor, consulting engineers, Charleston, has been elected secretary of the board, the other members of which are Frank Haas, Fairmont, consulting engineer, Consolidation Coal Co.; H. C. Cooper, Clarksburg, general superintendent, Hope Natural Gas Co., and N. H. Mannakee, Bluefield, consulting mining engineer.

L. J. Stoddard, sales manager small tool division, Greenfield Tap & Die Corporation, Greenfield, Mass., has resigned, effective Jan. 1, to become sales manager of the Lakeside Forge Co., Erie, Pa., manufacturer of wrenches and drop forgings.

Carveth Wells gave an illustrated lecture on "Six Years in the Jungle" at an open meeting of the Boston section, American Society of Mechanical Engineers on Nov. 28, at the Harvard Union, Cambridge, Mass. Mr. Wells is a graduate of the University of London, and an associate member of the Institute of Civil Engineers, London. He spent many years building railroads in the Malay Peninsula, and his lecture concerned his experiences in connection with this work.

Henry D. Hibbard, consulting metallurgist, Plainfield, N. J., sailed on Nov. 30 for a sojourn in southern France and Italy.

John Agnew, formerly associated with the Philadelphia Rolls Corporation in charge of sales, has joined the sales organization of the Wheeling Mold & Foundry Co., Wheeling, W. Va.

Charles Addams, formerly a sales engineer with the Standard Roller Bearing Co., Philadelphia, has since Nov. 1 been identified with the Bearings Co. of America as sales engineer in the Eastern territory.

Lewis R. Smith, long identified with the Matthew Addy Co., has given up the management of the company's New York business to become its general representative, engaging in the larger plans of development which this company has inaugurated. The New York office has been discontinued.

More portland cement was produced in October than in any other month of 1921, notwithstanding the seasonal trend. Production was 10,506,000 bbl.; shipments, 12,114,000 bbl.; stocks held at end of month, 5,348,000 bbl., according to figures of the United States Geological Survey. Beginning with May, shipments have exceeded production every month, thus reducing stocks gradually from 12,600,000 bbl. at end of April to 42½ per cent of that amount. Shipments for the ten months (86,159,000 bbl.) exceeded the average of the five previous years by 11.3 per cent.

The Connecticut State Section of the American Society of Mechanical Engineers held its annual meeting on the evening of Nov. 28 in the Hartford Electric Light Co., Hartford, Conn., building. Among those who spoke were: R. C. Moore, chief engineer Schieren Co., New York, belting; Prof. William Kenerson, Brown University, Providence, R. I.; and Ernest Hartford, New York. During the afternoon, members of the society visited the plant of the Jewell Belting Co.

OBITUARY

AXEL S. VOGT, formerly mechanical engineer of the Pennsylvania Railroad, died in Philadelphia Nov. 11, in his seventy-third year. Mr. Vogt was born in Christianstad, Sweden, Jan. 19, 1849, and educated in the Swedish public schools. He came to this country in the early 70's and was employed as a draughtsman by the Rhode Island Locomotive Works. He entered the service of the Pennsylvania Railroad in 1874 as draughtsman, becoming chief draughtsman two years later, and with an intermission of a little over a year, when he was with Schutte & Koerting, machinists, Philadelphia, he spent the remainder of his active service with the road at Altoona. He became assistant engineer of tests in 1883, assistant engineer in 1886, and mechanical engineer in 1887, retaining the latter position until his retirement under the pension regulations of the road in February, 1919. Subsequently he became connected with the Baldwin Locomotive Works in a consulting capacity and held this position at the time of his death. Mr. Vogt's work was marked by great originality and artistic taste. He was a man of broad reading with a most retentive memory, and while the greater part of his work was devoted to the development of the steam locomotive, he seemed to be equally fertile in other branches of railroad mechanical engineering. Personally he was a charming companion.

HARRY D. HAMMOND, aged 51, sales agent at Indianapolis for the National Malleable Castings Co., Cleveland, died Nov. 22 at Boston. He joined the National Malleable Castings Co. in 1903 and was located at Indianapolis.

WILLIAM B. LANE, president Will B. Lane Unique Tool Co., 170 West Randolph Street, Chicago, died in that city on Nov. 19, aged 64.

FREDERICK A. KEYES, sales agent American Steel & Wire Co., died this week at his home in Westfield, N. J., at the age of 57.

Graduate from Foremen's Safety School

Graduation exercises held in McCreery's restaurant, Pittsburgh, Thursday evening, Nov. 17, concluded one of the largest and most successful foremen's safety schools ever conducted by industrial plants in the United States. The graduating class numbered 750 and each graduate received a diploma from the National Safety Council.

The safety school for foremen of industrial plants in the Braddock, Pa., district was inaugurated by O. J. H. Hartsuff, general superintendent Edgar Thomson Works, Carnegie Steel Co., and was originally intended for the instruction of Edgar Thomson plant foremen in safety matters. Later, however, he widened the scope of the course to include foremen from all the industries of the district, and the various plants of the district were represented on the committee which had charge of arrangements. Sessions of the school were held in the auditorium of the Braddock Carnegie Library under the direction of E. S. Willis, an expert in safety work. There were addresses on safety subjects by Dr. R. M. Little, New York Industrial Commission; J. A. Oertel, Carnegie Steel Co.; John Martin, burgh; E. Friedlander, Edgar Thomson Works, and Ohio Works, Carnegie Steel Co.; F. H. Trego, Pitts-Dr. William T. Dorward, Milwaukee.

William Laughlin, of the machine tool firm of Laughlin & Barney, 483 Union Arcade, Pittsburgh, has retired and his interests in the firm have been taken over by his partner, Harry Barney, who will continue the business under the trade name of the Laughlin-Barney Machinery Co. There will be no change in the personnel of the organization and the company will remain in its present location.

DECREASE IN JAPANESE TRADE

Buying Lighter from Far East—Yellow River Bridge Not Awarded—Argentina Active

NEW YORK, Nov. 29.—Japanese trade has declined considerably during the past two weeks. This change in the export situation is attributed to various causes, among which are the recent assassination of the Japanese premier, the present conference in Washington, and the fact that shipments of the fairly large orders of a few months ago are beginning to arrive in Japan. Japanese buying is temporarily confined to orders from small consumers. One New York exporter during the past week has booked 1000 kegs of wire nails and 40 tons of galvanized sheets, losing one order for a tonnage of wire rods on which he offered to quote \$50 per ton, c.i.f. Japanese port. Some copper buying continues. The Chinese market is in much the same condition as the Japanese.

The design contest and contract for the Yellow River bridge in China, entries on which were opened June 30, has not been decided.

South American contracts awarded to American builders continue to increase. The Foundation Co., New York, has a contract for dam construction in Brazil. Some buying is being done, principally from Argentina. One order from this source, recently placed, called for about 400 tons of galvanized sheets. An exporter, who was among the low bidders, submitted a quotation based on 3.45c. per lb. base, Pittsburgh, plus rail and ocean freight to Buenos Aires, but did not receive the order, which was either placed at a lower base price or the seller figured a lower than regular ocean freight rate.

The Ministry of Agriculture and Commerce in Japan has authorized a committee to consider the standardization of gages and sizes in the manufacture of machines and tools of all kinds, according to the *Trans-Pacific*. This is a part of the intended adoption of the metric system provided for by the Japanese Diet.

Ford Motor Co.'s Proposed Electric Steel Plant

An electric steel plant of large capacity is planned by the Ford Motor Co. at its River Rouge plant, near Dearborn, Mich. Two electric furnaces of 10 to 15 tons capacity have been purchased, and a third furnace will be of 40 to 60 tons capacity. The ultimate installation may consist of eight to ten furnaces of 10 to 15 tons capacity each and two furnaces of 40 to 60 tons. The furnaces are to be used at first in melting scrap, but in the final form the plant will provide for the taking of hot metal from the blast furnaces to a mixer and a Bessemer converter, the metal being subsequently dephosphorized in the large electric furnaces and finally refined in the smaller electric units.

Quarter Deficit of Colorado Fuel & Iron Co.

The deficit of the Colorado Fuel & Iron Co. for the third quarter of 1921 amounted to \$810,868, after taxes, interest, depreciation, etc. This compares with a deficit of \$273,752 in the preceding quarter and a surplus of \$307,376 in the corresponding period of 1920. For the first nine months of 1921 the deficit amounted to \$579,094, as compared with a surplus of \$1,890,515 in the corresponding period of 1920.

Plans of Utah Steel Corporation

The Utah Steel Corporation, Salt Lake City, Utah, has plans under way for the erection of plant extensions which will include a blast furnace and a sheet mill plant for the manufacture of sheets and light plates. It is stated that the erection of the sheet mill plant will be started within 90 days and that the company expects to commence the erection of its blast furnace within six months. Engineers are working on preliminary plans for the blast furnace.

Machinery Markets and News of the Works

LARGE LIST ISSUED

American Locomotive Co. Inquires for 35 Tools for Schenectady Works

Missouri, Kansas & Texas Railroad Buys Heavily Against Its Recent Inquiry

Another indication that railroad buying may be the means of leading the machine-tool industry out of its depression is the list of the American Locomotive Co., New York, just issued, calling for quotations on 35 miscellaneous tools for an addition to its Schenectady works. From St. Louis and Cincinnati it is reported that the Missouri, Kansas & Texas Railroad has purchased heavily against its recent large inquiry. One Cincinnati tool builder received an order for five lathes; several drilling machines, a crank planer and other tools were also ordered.

Prospects of continuing railroad buying are fairly encouraging. At Chicago the Illinois Central and Chicago & Northwestern are working on budgets for 1922 and lists of machine-tool requirements are expected early in the new year. The Rock Island is expected to issue a list before the end of the year. The Santa Fe has asked for revised quotations on outstanding in-

quiries and in addition has inquired for two axle lathes, two 20-in. engine lathes and a radial drill. The Erie Railroad, at New York, is buying a few used tools against its recent inquiry.

There is an appreciable gain in the demand for tools, but many of the inquiries call for second-hand equipment. The American Steel & Wire Co., at Cleveland, has asked for prices on six used tools. The North East Electric Co., Rochester, N. Y., also wants six or seven used machines.

The International Nickel Co. has bought additional shop equipment for its new plant at Huntington, W. Va. A Cincinnati company is reported to have received an order for 10 lathes.

The American Car & Foundry Co., New York, has recently inquired for a few tools and some cranes. The demand for cranes has shown a steady improvement in recent weeks.

The New York Board of Education will shortly issue a new list of more than 100 metalworking machines and a considerable number of woodworking machines. The Youngstown schools require tools for manual training departments, the inquiry including six 10-in. and six 13-in. lathes.

A leading manufacturer of planers announces a price reduction of 15 per cent.

New York

NEW YORK, NOV. 28.

The American Locomotive Co., 30 Church Street, New York, has issued an inquiry this week for 35 machine tools to equip an addition to its plant at Schenectady, N. Y. The list follows:

- Two 6A automatic chucking and turning machines.
- One Lo-Swing lathe, 4 x 84 in.
- One 12 x 60-in. plain grinder.
- One 8 x 18-in. plain grinder.
- One Heald grinder, No. 70.
- One Besly 29-53 vertical grinder.
- One Besly 6 x 20-in. grinder.
- One No. 3 La Pointe broaching machine.
- One No. 4 Cincinnati vertical milling machine.
- One 5-ft. radial drill.
- One 3-ft. radial drill.
- One 10-in. vertical tool room shaper.
- One 38 or 42-in. vertical turret lathe.
- One 24-in. pillar shaper.
- One No. 31 Lucas precision horizontal boring mill.
- Two 2B two-spindle column-type high-speed drills, maximum capacity 3/4-in. hole in steel; 15 or 21 in. overhang.
- One Whitney hand miller.
- One 50-ton Lucas geared press.
- One 2X automatic tapping machine.
- One Cochran-Bly saw, 7 or 8-in. capacity.
- One Peerless saw.
- One Colburn D-6 drill, 37 in.
- One 18 in. x 5-ft. engine lathe.
- Three 22-in. lever drill presses.
- One 16 in. x 8-ft. tool room lathe.
- One 18 in. x 8-ft. tool room lathe.
- One No. 3 universal milling machine.
- One 18-in. pillar shaper.
- One Greenfield cutter grinder.
- One 12 x 36-in. universal grinder.
- One No. 2 surface grinder.

November machine-tool business has been uneven. Some sales offices in New York report this month's sales in excess of October, which had been the best month of the year, but others say that their sales have not quite equaled those of October. In any event the gain in business is negligible, and

on the whole November business probably just about equals that of last month.

Buying is still confined to widely scattered orders for single tools. Although railroad activity looks more promising very little business has yet developed. The Erie Railroad is picking up a few second-hand tools against its recent inquiry. The American Car & Foundry Co. has recently inquired for a few tools.

The American Sugar Refining Co., which recently purchased about a dozen metal-working machines, has an inquiry out for seven wood-working machines.

The New York Board of Education will issue a new call for bids on machine tools within a week or 10 days, this list being entirely different from that issued a few weeks ago. The new list includes more than 100 metal-working tools, a number of wood-working machines, and all attachments, small tools, etc. The list of the metal-working machines is to be about as follows:

- Seven milling machines, No. 1 Kempsmith or equivalent.
- Seven 15-in. shapers, Potter & Johnson or equivalent.
- 14 14-in. engine lathes, Monarch or equivalent.
- 28 12-in. engine lathes, Monarch or equivalent.
- 14 11-in. engine lathes, Blount or equivalent.
- Seven 20-in. drill presses, Superior or equivalent.
- Seven power hack saws, 6 x 6 in.
- Seven 14-in. wet tool grinders.
- Seven annealing furnaces.
- Seven blowers for furnaces.
- One cutter grinder, equivalent to Brown & Sharpe No. 2.
- One universal grinder, equivalent to Brown & Sharpe No. 1.

The above tools are for general machine shops in the schools. The tools listed below are for automobile mechanics' shops:

- Six 12-in. engine lathes.
- Seven 20-in. drill presses.
- Seven bench tool grinders.
- 13 3-hp. motors.
- Two 10-hp. motors.
- Four 2-hp. motors.

The National Tool Co., Cleveland, is interested in receiving information regarding molding machines. Literature

should be addressed in care of E. S. Chamberlain at the company's New York office, room 553, 50 Church Street.

Sales of cranes in the overhead field are extremely light with little prospect of any immediate improvement. Sellers of locomotive cranes, however, anticipate the development of some inquiry from the numerous construction contracts, domestic and foreign, which have been let during the past few weeks. Inquiry for locomotive cranes is fairly active.

Among recent sales was a bucket crane of about 7½ tons capacity, sold by the Whiting Corporation through the Wingham Bates & Goode Trading Co., New York, to the International Cement Co., Hudson, N. Y. The Cleveland Crane & Engineering Co. has sold two 2-ton tramrails, one to the Asbury Graphite Co., Asbury, N. J., the other to the Long Handkerchief Co., Scranton, Pa. The Textile Finishing Machine Co., Providence, R. I., has not yet closed for the seven cranes on its list recently issued.

The Suffolk Body Co., Sayville, L. I., manufacturer of automobile bodies, is considering the erection of a new one-story plant, 100 x 350 ft., at Sayville. Plans will be drawn at an early date.

The Forged Steel Yoke Corporation, a Virginia corporation, has filed notice of intention to operate in New York for the manufacture of steel forgings and other steel products. It is represented by P. A. Degener, 233 Broadway, New York.

The plant and business of the Reliance Spring & Mfg. Co., 3903 Second Avenue, Brooklyn, have been acquired by the Newcomb Spring Corporation, 238 Fortieth Street, Brooklyn, and future operations will be conducted under the latter name at the last noted address. E. L. Newcomb is president.

The Seneca Copper Corporation, 11 Broadway, New York, has arranged for a sale of 100,000 shares of additional capital stock, the proceeds to be used for the purchase of machinery at its mining properties and those of its subsidiary adjoining, the Gratiot Mining Co., and for extending operations.

Tindall & White, Inc., 239 East Twenty-second Street, New York, has acquired the business of the Perfection Sales Co., same address, and will continue the manufacture of all-metal lighting fixtures, etc. Officers of the new company, formerly connected with the Perfection organization, include W. L. Tindall, president and general manager, and C. A. White, secretary.

Plans for the construction of a four-story ice-manufacturing plant, 78 x 100 ft., to cost in excess of \$75,000, at Webster and Carter avenues, New York, are being prepared by William H. Meyer, 1861 Carter Avenue, architect, who will take bids at an early date.

The Superintendent of Public Works, Charles L. Cadle, Albany, N. Y., will take bids until Dec. 20, for the installation of power equipment, battery charging apparatus and kindred equipment at the Barge Terminal warehouse, Gowanus Bay, Brooklyn, as per specifications on file at the office noted.

The Mutual Lamp Mfg. Co., Houston and Crosby streets, New York, now occupying a portion of the seven-story building at this location, has purchased the entire structure, 64 x 120 ft., for extensions.

The Clark Machine Works, Belmont, N. Y., has been reorganized under the name of the Clark Tool Works, Inc., for the manufacture of metal-cutting tools. Operations will be continued at the same location.

The Loening Aeronautical Engineering Co., 351 West Fifty-second Street, New York, has completed plans for a new one and two-story factory, 98 x 129 ft., on property recently acquired at 420-28 East Thirty-first Street, to manufacture aeroplanes, flying boats, etc. It will cost about \$40,000. J. O. Whitenack, 231 West Eighteenth Street, is architect.

Following an expenditure of about \$60,000,000 for extensions and improvements in its properties and electric subsidiaries during the past year, the Consolidated Gas Co., 130 East Fifteenth Street, New York, has arranged for a bond issue of \$20,000,000, the proceeds to be used in part for the expansion program and general operations. The company operates the Astoria Light, Heat & Power Co., Astoria, L. I.; United Electric Light & Power Co., New York, and which latter interest is now building an electric generating plant on the East River to cost in excess of \$5,000,000. George B. Cortelyou is president.

The Page Motors Corporation, New York, headed by Major Victor Page of Munn & Co., 233 Broadway, New York, is perfecting plans for the operation of a plant at Farmingdale, L. I., to manufacture a new automobile with air-cooled motor and special chassis. Charles Beadon is vice-president.

The Knickerbocker Ice Co., 45 East Forty-second Street, New York, has completed plans and will commence the immediate erection of a one-story plant, 49 x 98 ft., at 148-50 Elizabeth Street, to cost about \$60,000. C. Leslie Weir, company address, is architect.

The Board of Education, Cohoes, N. Y., is planning for the installation of machine shop equipment, with transmission apparatus and hand tools at the department of industrial arts, high school.

The Royal Metal Furniture Co., 125-9 Eighth Street, Brooklyn, has filed plans for an addition, 61 x 176 ft., at 168-86 Seventh Street. William Higginson, 18 East Forty-first Street, New York, is architect.

The Wyoming Coal Co., Inc., 163 Sixth Street, Brooklyn, has had plans completed by the Guarantee Construction Co., 140 Cedar Street, New York, for a two-story, mechanically operated coal pocket, estimated to cost about \$50,000 with equipment.

Operating equipment to cost about \$3,000,000 will be used by the Transit Commission, 49 Lafayette Street, New York, in connection with the construction of the proposed river-to-river moving platform under Forty-second Street, for traffic. Preliminary plans and estimates have been prepared by Daniel L. Turner, chief consulting engineer for the commission. The entire project is estimated at \$10,500,000.

A two and one-half story automobile service building and repair works, 100 x 200 ft., to cost \$125,000, will be constructed at Thirteenth and Williams streets, Long Island City, by the Interstate Land Holding Co., Long Island City. The Ettinger Contracting Co., 44 Court Street, Brooklyn, is contractor, and Frank S. Parker, last noted address, architect and engineer.

The Bullock Mfg. Co., New York, manufacturer of lighting fixtures and equipment, has removed its plant from 408 West Thirteenth Street to 356 West Fortieth Street, where an entire factory will be occupied. Former production will be increased.

The Hunter Coal Co., 1576 Flatbush Avenue, Brooklyn, will build a one-story coal pocket, 36 x 130 ft., at 1064-76 East Thirty-fourth Street. Gustave Jensen, 639 Seventy-seventh Street, is architect.

The Wilson-Phifer Co., Millville, N. J., has acquired a local factory which it will equip for the manufacture of automobile bodies and kindred products.

The Vulcan Iron Works, Hudson Street, Jersey City, N. J., manufacturer of marine iron and steel products, has filed plans for a one-story addition, to cost about \$17,000, exclusive of equipment.

The American Type Founders Co., Communipaw Avenue, Jersey City, is planning the erection of a one-story foundry at Elmora, near Elizabeth, N. J.

The Millville Iron Works, Inc., Millville, N. J., recently incorporated with a capital of \$100,000, has arranged for the immediate operation of a local plant for the manufacture of iron and steel specialties. Daniel E. Campbell and Lester Fleetwood, Sixth Street and Florence Avenue, head the company.

The Board of Directors, New Jersey State Home for Boys, Jamesburg, N. J., L. L. Jackson, superintendent, has plans under way for the construction of a cold storage plant. A. B. Mills, 142 West State Street, Trenton, N. J., is architect.

The Perseverance Paper Mill Co., Lambertville, N. J., will remodel and improve its plant, including the installation of new equipment and repairs to present machinery, prior to resumption of operations. The mill has been closed for more than 12 months.

Pfaff & Kendall, 655 Ferry Street, Newark, N. J., manufacturers of iron pipe columns, have filed plans for the construction of a two-story plant, 38 x 111 ft., on Foundry Street, to cost about \$18,000.

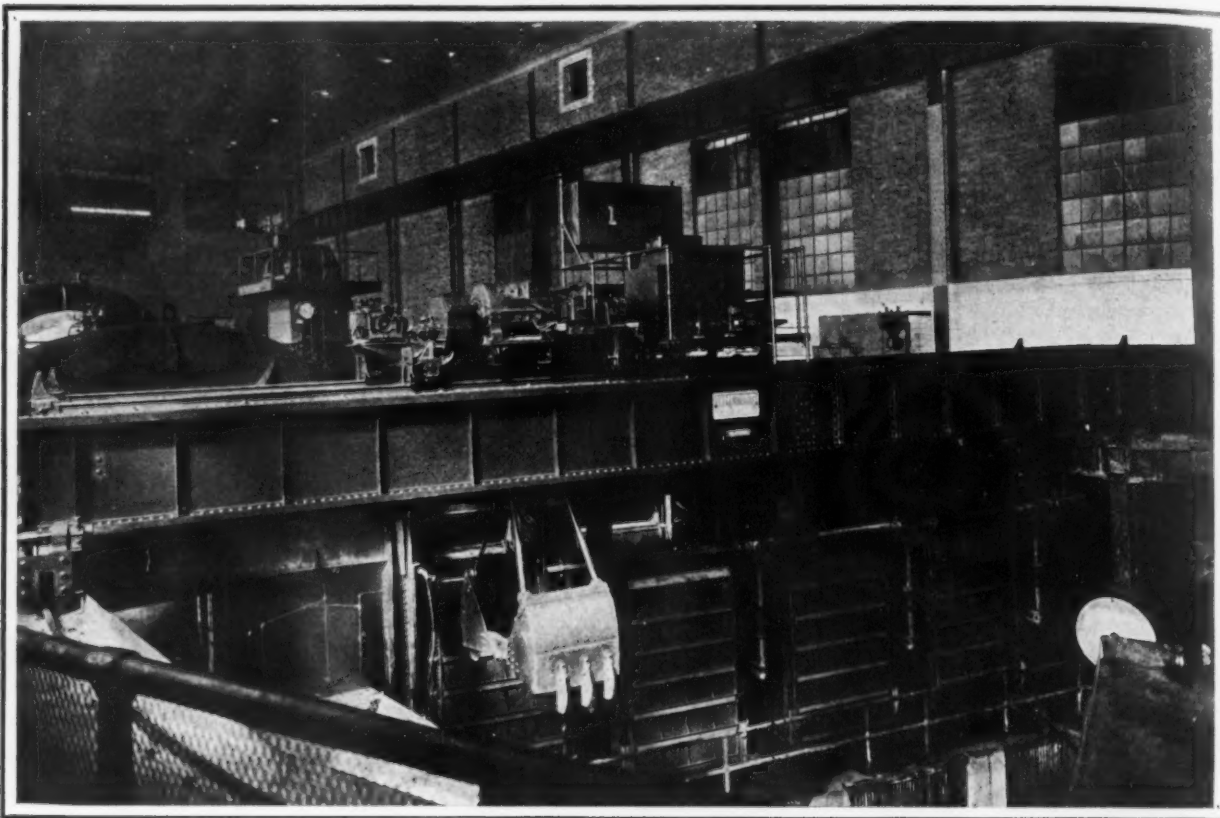
The Board of Education, room 316, Essex Building, Newark, N. J., will receive bids until Dec. 14 for steel lockers for installation at the local vocational schools. Robert O. Beebe is director.

The Peerless Weatherstrip Co., 390 Eleventh Street, Newark, manufacturer of metal weatherstrips, has purchased property at 51-53 Laurel Avenue, Irvington, 70 x 200 ft., improved with two buildings, for a new plant. The existing structures will be remodeled for early occupancy. Joseph C. and John C. Fauner head the company.

The Van Sicklen Co., Elgin, Ill., manufacturer of speedometers and other precision instruments, has abandoned plans for the establishment of a factory at Newark, N. J., and has disposed of the plant on Warren Street, recently acquired under lease, to the Prudential Insurance Co.

A vocational department will be installed in the new three-story high school to be constructed by the Board of Education, Clifton, N. J., estimated to cost in excess of \$800,000.

The Gulf Refining Co., Plum Point Lane, Newark, has filed plans for an addition to its plant on Doremus Avenue, to cost about \$62,000.



CRANE SERVES AS DREDGE FOR INTAKE WELL

The debris arrested by the iron grills is removed by a grab bucket operated from the crane. The shape of the intake well is that of a sector of a circle and the crane spans it radially, having one end truck pivoted at the center of the circle and the other end traveling on a circular track. The crane trolley with its bucket travels along the entire length of the crane bridge. The crane was furnished for the power plant of the Union Gas & Electric Co., Cincinnati, by the Whiting Corporation, Harvey, Ill., to specifications issued by Sargent & Lundy, Chicago, engineers on the work.

New England

BOSTON, Nov. 28.

Indications early this month that November bookings of machine tools would exceed those for October failed to materialize, business the past fortnight more than offsetting any advantage gained the first 15 days. As the week closes the market virtually is at a standstill. An inquiry for a 12,000-lb. steam hammer and a 25-ton crane are the only important developments. New prospects for single machines have come into the market but are few in number, and most buyers express a preference for used equipment. In Boston, at least, the used tool market appears to have been thoroughly overhauled and there is a noticeable shortage of certain kinds of machines. As a result, used machinery dealers are turning their attention to Canada for supplies. Under such conditions prices should be steady or firm, but they are still tending downward, due to the scarcity of going business.

No great change in conditions is anticipated by the trade the remainder of 1921, but it is believed that things will be very much better early in 1922. One of the largest New England industrial manufacturers is making an investigation of each individual piece of equipment for the purpose of determining from an efficiency standpoint if it shall be retained, retooled, discarded or replaced. Several hundred metal-working machines are involved and the company already is inquiring on various types of equipment. Other important industries have made surveys of their equipment to determine the most profitable purposes to which it can be applied. As to railroad buying, local interests are not counting as much on New England carriers as is the machine-tool trade in other sections of the country on the larger roads. One New England road has inquired on a small list of tools for estimating purposes, another has signified its intention of buying some equipment early in 1922, while a third will require a fairly large amount of machines for a contemplated new shop, but there is nothing definite about these prospects.

From the New England machine-tool manufacturing standpoint, however, things are slowly but surely improving, as business is coming from other sections of the country. It is interesting to note that the artificial stone manufacturing industry in this section of the country is active and expanding, thereby offering a prospective field to the makers of cranes. The American Woolen Co. has not covered on its

crane requirements, nor has the Textile Finishing Machinery Co., Providence.

The Armstrong line of high-speed cutters has been reduced about 10 per cent. One manufacturer of carriage clamps, used extensively in shops, has reduced prices approximately 40 per cent. Coe wrenches heretofore quoted at 33½ per cent discount are now 40 and 10 per cent.

L. A. Vachon, Inc., Washington Street, Brookline, Mass., is building a two-story, 60 x 149-ft. sales and service station for automobiles.

The Suffolk Oilless Bearing Co., Woburn, Mass., contemplates opening a plant about Dec. 1 in Buel Place to manufacture impregnated hardwood oilless bushings. George E. Parker, Jr., 230 South Street, Boston, is president, and Austin H. Welch, 105 Blossom Street, Fitchburg, treasurer.

The Fuller Brush Co., Hartford, Conn., will build in the near future a four-story, 80 x 400-ft. manufacturing plant, at an estimated cost of \$400,000. It has outgrown its present quarters and is obliged to occupy space outside.

The Thompson-Copeland Co., Worcester, Mass., with a capital of \$50,000, has been organized to manufacture a general line of iron and steel products. John T. Brierly, formerly of Brierly, Lombard & Co., Worcester, manufacturers' supplies, is president of the new company, Eugene A. Copeland, formerly with the Hobbs Mfg. Co., Worcester, is vice-president, and Harry C. Thompson, also formerly with the Hobbs Mfg. Co., treasurer. The company has been negotiating for manufacturing space in Worcester and is expected to shortly make an announcement. Initial production probably will be confined to a newly patented article.

The Crane Co., Bridgeport, Conn., manufacturer of valves, steam specialties, etc., has awarded a contract to the T. J. Pardy Construction Co., Bridgeport, for the erection of its proposed one-story addition, 75 x 175 ft., to cost about \$48,000, exclusive of equipment. Ten annealing furnaces and auxiliary equipment will be installed.

The Chadwick-Boston Lead Co., 10 Hampden Street, Roxbury, Mass., is considering the rebuilding of the portion of its plant recently destroyed by fire with loss of about \$30,000.

The Meisel Press Mfg. Co., 949 Dorchester Avenue, Boston, manufacturer of printing presses, screw machine products, etc., has purchased about 13 acres at Dorchester Avenue and Locust Street, as a site for a new plant to give employment

to about 1000 operatives. Plans will be prepared at an early date.

Edward T. Davis, Springfield, Mass., has awarded a contract to the Edward Radding Construction Co., 158½ Main Street, for the construction of a one-story automobile service and repair works, 75 x 100 ft., on Taylor Street, to cost about \$50,000.

C. N. James, 139 Brookline Street, Cambridge, Mass., manufacturer of automobile wheels, will commence the immediate erection of a one-story addition, 100 x 125 ft., estimated to cost close to \$50,000.

Failure of foundation caused the electric-charging building of the submarine base, New London, Conn., of the Bureau of Yards and Docks, Navy Department, to fall into the Thames River, Nov. 18, with loss estimated at \$50,000. The structure was equipped with machinery for charging submarine batteries and kindred work. Captain F. D. Berrein is commandant at the base.

Philadelphia

PHILADELPHIA, NOV. 28.

The Department of City Transit, City Hall, Philadelphia, will commence the immediate erection of two new power houses on Cumberland and Grescom streets, estimated to cost \$45,000 and \$42,000, respectively.

The O'Brien Machinery Co., 119 North Third Street, Philadelphia, has received a contract from the Bureau of Water, City Hall, for engine lathes to cost \$14,700, for installation at its new machine repair shop. Other machine tools will be installed, contracts for which will be let at an early date.

The City Purchasing Agent, Room 312, City Hall, Philadelphia, will receive bids until Dec. 6, for tools and hardware, as per schedule on file. A. Lincoln Acker is purchasing agent.

The Producers' Cold Storage Terminal, Inc., 1214 Widener Building, Philadelphia, will take bids about Jan. 1 for its ten-story ice and cold storage plant, at Water and Swanson streets, 90 x 275 ft., estimated to cost in excess of \$1,000,000 with machinery. Andrew J. Sauer & Co., Denkle Building, are architects and engineers. C. P. Sharpless is president.

The Penn Motors Corporation, 1714 North Broad Street, Philadelphia, Hilton W. Scofield, head, will take bids at once for its one-story automobile manufacturing plant at Pleasantville, N. J., 50 x 300 ft., with power house. Charles H. Donehower, Pleasantville, is engineer.

Fire, Nov. 18, destroyed a portion of the factory of the L. Martin Co., Milner Street, Philadelphia, manufacturer of carbon products, lamp black, etc., with loss of about \$100,000, including machinery. Headquarters of the company are at 81 Fulton Street, New York.

A machine shop for parts manufacture and general repair work will be installed in the eight-story automobile service building, 35 x 65 ft., to be constructed at 113 North Prince Street, Lancaster, Pa., by the Domback & Bissinger Motor Co. Grover C. Snyder, 28 North Mary Street, is architect and engineer.

Receivers for the Owen Magnetic Motor Car Corporation, Forty Fort, Pa., have been ordered by the Federal District Court to advertise and hold another sale of the property. Recent bids, tentatively accepted, are held as inadequate.

The Schmick Gear & Screw Co., Williamsport, Pa., recently organized under Delaware laws, has awarded contract to J. V. Bennett & Co., Williamsport, for a one-story plant at Campbell and Edwin streets, 40 x 100 ft., to manufacture special type automobile jacks and kindred products. E. E. Schmick is head. F. Arthur Rianhard, Masonic Temple Building, is architect.

Fire, Nov. 20, destroyed the automobile service and repair works of the Routman Motor Co., Sharon, Pa., with loss reported at \$35,000.

The Board of Trustees, State Hospital for Insane, Norristown, Pa., will receive bids until Dec. 6 for a motor-driven centrifugal pump, metering feed-water heater, flue gas pyrometers and recording watt meter panel board for the power house. W. W. Hibbert, 415 Penfield Building, Philadelphia, is engineer for the board. Oscar L. Schwartz is steward.

A machine shop and mechanical department will be installed in the new high school to be erected by the Board of Education, Reading, Pa.

A new power house, with ice-manufacturing and ice storage plants, will be built by the Board of Directors of the Harrisburg Hospital, Harrisburg, Pa., in connection with the erection of additions to the institution, estimated to cost close to \$900,000, with site.

A one-story power house will be constructed by the Lancaster Milk Products, Inc., Lancaster, Pa., at its new plant at 623 Thirty-second Street, Lancaster, estimated to cost about \$100,000. John Harman, 48 North Queen Street, is architect.

Chicago

CHICAGO, NOV. 28.

The holiday last week accentuated the dullness of the market. The general situation shows little change, but prospective railroad buying seems closer to realization. The Rock Island, which has delayed buying for months because it regarded prices too high, is expected to issue a large list in the near future. The Santa Fe has asked for revised quotations on a list for its Argentine, Kan., shops, and in addition is inquiring for two axle lathes, two 20-in. engine lathes, and one radial drill. The Chicago & Northwestern and the Illinois Central are both working on their budgets and will probably issue lists early next year. At St. Louis the Missouri, Kansas & Texas has bought against its large inquiry reported in these columns some weeks ago.

The Rienzi Garage, 554 Diversey Boulevard, Chicago, has had plans drawn for a one-story garage, 117 x 230 ft., at the northeast corner of Lehman Court and Dole Avenue, to cost \$100,000.

F. M. Feldman has purchased property at 15-19 South Racine Avenue, Chicago, and will at once erect an auto sales and service station to cost \$30,000.

Charles S. Smith, Berwyn, Ill., has taken out a building permit to construct a one-story sales room and service station, 100 x 150 ft., at the northwest corner of Harlem and Ogden avenues, to cost \$20,000.

The Swartz Mfg. Co., Freeport, Ill., has been incorporated with \$100,000 capital stock to do a general foundry and machine shop business. A plant is now being constructed, but equipment has not yet been bought. Carl H. Swartz is president and treasurer and R. G. Youngblut, secretary.

The Rockford Automatic Sprinkler Co., 419 West State Street, Rockford, Ill., has been incorporated with \$10,000 capital stock to engage in a contracting business for the installation of automatic fire sprinklers, steam and hot water heating. It has no plant at present. The officers are P. Schultz, president; D. E. McDaniel, secretary, and A. J. Retinger, treasurer.

The Agate Auto Appliance, Inc., 1721-25 Park Avenue, Chicago, is a reorganization of the Agate Foundry & Pattern Works. A change in name was prompted by the fact that the company's production now consists of automobile accessories, which it is marketing itself. It requires no additional equipment at present. The officers are: President, J. P. Brownlee; vice-president, D. H. Brownlee, and secretary-treasurer, K. H. Brownlee.

H. E. Forke, 3261 Fullerton Avenue, Chicago, has let contract for a one-story garage and automobile repair shop, 50 x 125 ft., on Milwaukee Avenue near Logan Square, to cost \$40,000.

The Duty Motor Corporation, 19 North Spring Street, Elgin, Ill., has let a contract for a one-story plant, 250 x 250 ft., for the manufacture of automobile trucks, estimated cost \$80,000.

Gerts, Lombard & Co., 2104 West Grand Avenue, Chicago, manufacturers of calcimine brushes, have let contract for a three-story factory, 26 x 85 ft., to cost \$27,000.

The Ogden Woodworking Co., 236 Kildare Avenue, Chicago, has let contracts for a one-story factory, 46 x 106 ft., to cost \$9,500.

The Woodruff & Edwards Co., Elgin, Ill., plans to erect a three-story foundry, 50 x 100 ft., to cost \$50,000.

The City Council, Corning, Iowa, will call for bids early in January for the erection of its one-story municipal electric power plant, estimated to cost about \$60,000. C. K. Munns, Corning, is engineer.

A complete machine shop, foundry, electrical department, automobile engineering department, and other mechanical departments will be installed in the two-story and basement vocational school to be constructed by the Board of Education, Chisholm, Minn., estimated to cost about \$400,000. E. F. Bromhall, 719 Alworth Building, Duluth, Minn., is architect.

P. G. McConnell, formerly connected with the Belden Mfg. Co., 2300 Southwestern Avenue, Chicago, has organized the McConnell Cable & Specialties Co., 426 South Clinton Street, to specialize in the manufacture of electrical specialties for automotive service, and other electrical equipment.

The Suburban Ice Co., La Grange, Ill., is contemplating the erection of a new ice manufacturing plant at Joliet, Ill., with initial daily capacity of 100 tons. It is estimated to cost \$60,000. L. E. Stanley is president.

The Board of Education, City Hall, St. Paul, Minn., will build a four-story manual training building, 70 x 130 ft., on Fourteenth Street, to cost \$60,000.

The Auto Top Co., 316 Park Avenue, Waterloo, Iowa, has awarded contract to John J. Judd, 711 Baltimore Street, for a one-story and basement plant to manufacture automobile tops and similar products. L. P. Miller is manager.

A machine shop, electrical shop and general mechanical department will be installed in the two or three-story junior high school to be erected by the Board of Education, Minneapolis, Minn., estimated to cost in excess of \$600,000. A site will be selected at an early date. E. H. Enger, City Hall, is architect.

Detroit

DETROIT, Nov. 28.

A slight recession in buying the past week is reported by local machine-tool dealers, partly due to the slowing up which precedes the inventory season.

The General Forgings Corporation is making rapid progress on the construction of the first unit of its plant at Salliotte Avenue and the Michigan Central Railroad, Detroit. The first floor will house die rooms, cold trim room and forge shop. Several other units are in prospect. The site owned by the company covers about 10 acres.

The Michigan Hardware Co., Grand Rapids, Mich., will soon start the erection of an addition, 100 x 100 ft., to cost \$30,000.

The Michigan Sheet Metal Works, Lansing, Mich., has moved into the new plant just completed by the H. G. Christman Co. and is planning on further expansions to take care of several contracts recently received.

The Olivine Co., Marquette, Mich., has started construction on a new rock crushing unit. When completed another unit will be erected.

The Champion Gravel Co., Iron Mountain, Mich., is completing a new rock crusher near Loretto, Mich. Another will soon be started at Pound, Wis.

The Muellers Metals Co., Port Huron, Mich., has received an order from a Detroit automotive manufacturer for brass parts amounting to \$525,000 and states that future orders for replacements will probably bring it up to \$750,000. The contract term is from Nov. 1, 1921, to Nov. 1, 1922.

A one-story power house will be erected by the Story & Clark Piano Co., Grand Haven, Mich. Plans have been prepared by Byron E. Parks & Son, Grand Rapids, Mich.

A vocational department will be installed in the two-story high school to be erected by the Board of Education, Kalamazoo, Mich., at a cost of \$200,000. Robinson & Campau, 715 Michigan Trust Building, Grand Rapids, Mich., are architects.

The American Brick & Tile Co., River Rouge, Mich., recently organized, has acquired about 16 acres of land, with 600 ft. water frontage, as a site for a plant to manufacture pressed brick, tile, etc. Plans will be prepared at once. About 500 men will be employed.

The Kent Cold Storage Co., Front Street, N. W., Grand Rapids, Mich., is arranging for the erection of a new refrigerating and cold storage plant. G. H. Hess is engineer in charge.

Pittsburgh

PITTSBURGH, Nov. 28.

The past week has developed some activity in cranes. The West Penn Power Co. has closed with the Milwaukee Electric Crane & Mfg. Co., Milwaukee, for two 10-ton, one-motor cranes, one for a subsidiary, the Windsor Coal Co., Wellsburg, W. Va., and the other for a repair shop at Logan's Ferry, W. Va. These cranes are of 27-ft. span, to run on a 15-ton bridge, and trolley and bridge are hand-controlled. The city of Toledo has closed for a 10-ton Niles crane for a new municipal pumping station. The Northern Engineering Works, Detroit, was the successful bidder for a 15-ton, with 5-ton auxiliary, 4-motor crane of 50-ft. span for the National Roll & Foundry Co., Avonmore, Pa. It is expected that the Sanderson Cyclone Blower Co., Orrville, Ohio, will close this week for a 10-ton crane, and the award of two and possibly four cranes wanted by the Standard Underground Cable Co. now is looked for before the end of the year. A good many requests for revised prices against old crane inquiries are coming in and also for prices for estimating purposes. Some of the Steel Corporation subsidiaries are likely to place cranes after the first of the year and the Wheeling Steel Corporation is another prospect.

Machine-tool business still is of small proportions and is largely of a pick-up character. One local firm reports sales of a 4-in. motor-driven pipe machine, three motor-driven drill presses and a small floor grinder. There is no business from the railroads nor from the railroad equipment companies. The Pressed Steel Car Co. early this year put out an inquiry for a grinder, but has not yet bought, and it is regarded as dormant. The West Penn Power Co. is yet to close on the list of tools put out early in the year and recently revived, and bids against the tools for the Western Penitentiary are being tabulated.

The Pittsburgh Malleable Iron Co., Thirty-fourth and

Smallman streets, Pittsburgh, has preliminary plans under way for a one-story plant at Ellwood City, Pa.

A vocational department will be installed in the new Samuel P. Langley High School, to be erected by the Board of Education, Pittsburgh, at Chartiers and Hutton avenues. The superintendent of buildings, 1326 Fulton Building, is in charge.

The Butler-Buick Co., Main Street, Butler, Pa., will take bids early in the year for a three-story service and automobile repair building on Main Street. The Hunting, Davis Co., 1150 Century Building, Pittsburgh, is architect and engineer.

The West Penn Power Co., Pittsburgh, operated by the West Penn Railways Co., has acquired the West Virginia & Maryland Power Co., Kingwood, W. Va., recently organized to operate at Grafton, W. Va., and vicinity. The power plant at the latter place will be taken over and extensions in generating plants and lines will be made.

The Jamison Coal & Coke Co., Greensburg, Pa., is planning for the installation of electrical equipment and other machinery at its No. 9 mine, Farmington, W. Va.

Fire, Nov. 23, destroyed the gas compressor plant of the West Virginia Utilities Co., Morgantown, W. Va., with loss estimated at about \$100,000, including machinery. It will be rebuilt.

The Kentucky & West Virginia Power Co., 30 Church Street, New York, is completing plans for a new generating plant in the Big Sandy district, near Pikesville, W. Va. Francis R. Weller, Hibbs Building, Washington, D. C., is engineer.

The Nitro Mfg. & Mine Supply Co., P. O. Box 1494, Nitro, W. Va., is arranging a list of equipment for installation at its machine shop and foundry, plans for which have been prepared.

Following the sale of its coal properties to the Consolidation Coal Co., Cumberland, Md., the Monongahela Power & Railway Co., Fairmont, W. Va., is planning to use a portion of the proceeds for extensions and improvements in its electric power plants and system. George M. Alexander is president.

Ohio

Cleveland dealers have received an inquiry from Youngstown for new equipment for a manual training school, the list including six 10-in. and six 13-in. lathes. The American Steel & Wire Co., through its Cleveland office, has sent out a new inquiry for about a half-dozen machines, used tools being specified. Inquiries are a little more plentiful and sentiment in the trade shows improvement. While inquiries are largely for single machines, two or three came out for lots up to four or five tools. The Durant Motors, Inc., is still buying equipment and is reported to have purchased during the week two large automatic machines from surplus equipment of a Detroit automobile plant. The U. S. Compressor Co., Cleveland, has purchased a three-spindle vertical drilling machine. The demand for presses continues fairly good.

There is virtually no change in the volume of standard tool sales. Many prospective purchasers are simply getting prices on machinery which they will not buy before the first of the year. This makes the outlook more promising for January, but the trade does not expect an increase in sales the remainder of the year. The only price change noted is a reduction of approximately 15 per cent on standard types of planers by the G. A. Gray Co., Cincinnati. The only crane order reported is one for a 10-ton Niles electric traveling crane placed by Toledo for a new waterworks pumping station.

Cincinnati manufacturers report the receipt of orders the past week which will bring the total for the month up to that in October. The Missouri, Kansas & Texas Railroad was a heavy buyer, one local manufacturer receiving an order for five lathes, another for several drilling machines, and one for a crank planer. A nearby manufacturer secured a number of shapers from the same road. The International Nickel Co. bought some equipment for its new plant at Huntington, W. Va., it being reported that a local manufacturer had secured an order for 10 lathes. A central Ohio machine-tool manufacturer bought three milling machines and a drill. Other sales of one and two machines, mostly used equipment, are reported, but the tendency to buy second-hand equipment at bargain prices is said to be slowly disappearing. A number of inquiries are being figured on at present and it is expected that after the first of the year many will develop into orders.

The Gallon Iron Works & Mfg. Co., Gallon, Ohio, is planning the erection of an addition to manufacture motor driven road rollers, and has placed contract for a 60 x 120 ft. steel concrete building for storage purposes.

The Interstate Cotton Pickers, Toledo, Ohio, has been organized with \$250,000 capital stock to manufacture a new

type of cotton picking machine, recently developed in that city. It is expected that a plant to manufacture the machines will be established in Toledo. William H. Albrecht, treasurer Interstate Coal Co., Toledo, is secretary.

The E-Z Collapsible Rim Co., Conneaut, Ohio, has increased its capital stock from \$10,000 to \$1,000,000 and plans to increase its facilities for manufacturing automobile rims. It is reported that the company has under consideration the addition of a drop forge plant. W. T. Manning is president, and Frank Haefner, secretary and treasurer.

The Superior Refrigerating Co., Wapakoneta, Ohio, is contemplating the extension of its plant to manufacture refrigerating machinery.

The Billings-Chapin Co., Cleveland, manufacturer of paint, is having plans prepared for a four-story addition, 80 x 110 ft.

The National Sulphur Co., New York, has acquired a site in Akron, Ohio, where it will at once begin the erection of a plant, including four main buildings, 250 ft. long, of steel construction, and a boiler house, involving an expenditure of approximately \$300,000.

The Lewis Electric Co., Minerva, Ohio, advises that the item recently published that contract for its new buildings had been let to the Boldt Construction Co., Cleveland, is incorrect. The company is erecting its own plant with the Watson Engineering Co., Cleveland, as engineer. The size of the main building is to be 62 x 162 ft., two stories, and there will be a one-story building, 20 x 40 ft., and a power plant, 20 x 25 ft. The construction is of brick and steel throughout. J. C. Lewis is president.

Baltimore

BALTIMORE, NOV. 28.

The Novelty Steam Boiler Works, 917 South Howard Street, Baltimore, has filed plans for a one-story addition, 52 x 73 ft., and two-story leanto building adjoining, 54 x 105 ft., to cost about \$25,000.

The Adamantex Brick Co. of Maryland, Baltimore, recently organized with a capital of \$1,000,000 to manufacture sand-cement bricks, has taken title to about 25 acres in the Towson section as a site for its plant. The initial works will develop a capacity of about 200,000 brick per day. Louis F. Ducker is president. The company is represented by Blum & Makover, Equitable Building.

The Darco Corporation, du Pont Building, Wilmington, Del., a subsidiary of the Atlas Powder Co., will break ground at once for its plant at Marshall, Tex., to manufacture a special refined carbon. It will have an initial output of about 6000 tons a year and with machinery will cost close to \$500,000. W. J. Webster is president.

A vocational department will be installed in the three-story and basement high school, 140 x 170 ft., to be erected by the Board of Education, Newport News, Va., at an estimated cost of \$400,000. Charles M. Robinson, Times-Dispatch Building, Richmond, Va., is architect. George L. Palmer, 2711 Washington Avenue, is chairman of the board.

The Southern Power Co., Charlotte, N. C., is planning for the construction of a new hydroelectric generating plant on the Catawba River, near Mountain Island, N. C., to develop about 80,000 hp. It is also proposed to enlarge the plant at Great Falls, S. C., from 40,000 to 60,000 hp.

The Bowie Stove Works, Rome, Ga., has filed notice of change of name to the Rome Range & Stove Co. Plans are nearing completion for rebuilding the local plant, recently destroyed by fire, with enlarged machine shop, foundry and other manufacturing departments. J. M. Berry is one of the heads of the company.

A vocational department will be installed in the two-story and basement high school, 75 x 300 ft., to be constructed by the Board of Education, Wilson, N. C., estimated to cost about \$250,000. C. C. Wilson, Palmetto Building, Columbus, S. C., is architect. C. L. Coones is superintendent of the board.

The Davis Motor Co., 221 West Fourth Street, Charlotte, N. C., is arranging a list of equipment to be installed at its automobile service and repair works. C. A. Burgess is president and general manager.

The Fulton Bag & Cotton Mill Co., Atlanta, Ga., has commissioned J. E. Sirrine & Co., Greenville, S. C., engineers, to prepare plans for a new power plant.

C. T. Ingram, Atlanta, Ga., has completed plans for a new ice factory, with initial daily capacity of about 50 tons, estimated to cost \$100,000, including machinery.

A machine and mechanical shop will be installed in the three-story high school, 215 x 270 ft., to be constructed by the Board of Education, Charlotte, N. C., at a cost of about \$300,000. A power plant and cold storage department will also be installed. Bids will be asked about Dec. 15. Lock-

wood, Greene & Co., 101 Park Avenue, New York, are architects and engineers.

The Standard Ice Co., Lynchburg, Va., has completed plans for an addition to its ice and refrigerating plant at 609 Main Street, 50 x 75 ft., and will commence work at once. E. C. Ivey is president.

The Continental Garage & Service Corporation, 715 Gaither Estate Building, Baltimore, has been organized and arrangements are being made for the establishment of a plant for the repair of automobiles, etc. J. Bacon Hyatt is interested.

The Fowler & Farley Engineering Co., 2121 Oak Street, Baltimore, recently organized, will establish a machine shop. A. R. Kasson is manager.

The Nash Motor Co., Oliver Street and Maryland Avenue, will build a three-story automobile repair and service station.

Indiana

INDIANAPOLIS, NOV. 28.

The Indiana Hydro-Electric Power Co., Indianapolis, recently organized with a capital of \$5,000,000, has plans under way for the construction of the first of five hydro-electric generating plants on the Tippecanoe River. It will be located at Norway, near Monticello, and is estimated to cost about \$1,000,000 with machinery. Subsequent plants, all to be tied in with a main transmission system, will be constructed at Oakdale, Springboro and Tioga, with final site to be selected. Samuel Insull, head of the Middle West Utilities Co., 72 West Adams Street, Chicago, is president of the company; Harry Reid, president of the Interstate Public Service Co., Indianapolis, is vice-president and general manager.

The Reedy Elevator Co., 1026 Kentucky Avenue, Indianapolis, manufacturer of passenger and freight elevators, has preliminary plans nearing completion for the erection of a new factory on South New Jersey Avenue estimated to cost about \$50,000. D. V. Reedy is president.

A vocational department will be installed in the three-story and basement high school, 230 x 450 ft., to be erected at Calhoun and Gumper streets, Fort Wayne, Ind. by the Board of Education, work upon which is under way. It will cost about \$750,000. Griffith & Goodrich, 211 East Berry Street, are architects.

The Carter Electric Co., Kokomo, Ind., has awarded a contract to Thomas Heckman, 810 South Webster Avenue, for a two-story and basement plant on South Washington Street to manufacture electrical specialties.

The International Harvester Co., 606 South Michigan Avenue, Chicago, is said to be planning to proceed with its new works on Pontiac Street, Fort Wayne, Ind., early in the spring. It will manufacture tractors and parts and is estimated to cost in excess of \$3,000,000. Day & Zimmerman, 611 Chestnut Street, Philadelphia, are engineers.

Buffalo

BUFFALO, NOV. 28.

The North East Electric Co., manufacturer of electrical equipment for automotive vehicles, Rochester, N. Y., wants the following used machines in good condition:

- No. 00 Brown & Sharpe automatics,
- No. 0 Brown & Sharpe automatics,
- No. 2 Brown & Sharpe automatics,
- Two 74½ Bliss straight side geared presses,
- No. 2 A Warner & Swasey screw machines,
- No. 5 Cochrane & Bly cold saw,
- Drop hammers up to 500 lb., either board or belt.

The Electro Refractories Corporation, Ellicott Square, Buffalo, manufacturer of crucibles, has awarded contract to Harding & Crea, Buffalo, for rebuilding its plant on Townline Road, East Hamburg, destroyed by fire Oct. 26, with loss approximating \$200,000. The new plant will include a main works, 50 x 300 ft., and machine shop, 30 x 75 ft. L. U. Milward is manager.

Z. T. Darrow, Canandaigua, N. Y., has completed plans and will construct by day labor a new one-story machine shop, 80 x 100 ft. William S. Lozier, Cutler Building, Rochester, N. Y., is architect.

The Board of Supervisors, Buffalo, is considering the construction of a central steam power house for service at the county jail and other buildings. Recommendation for the plant has been made to the Board by William F. Waldow, County Sheriff, in charge.

A machine and mechanical department for vocational instruction will be installed in the two-story high school to be erected by the Board of Education, Williamsville, N. Y., estimated to cost about \$150,000. Martin C. Miller and Daniel McNeil, associated architects, 80 West Genesee Street, Buffalo, are preparing plans.

Guerdon Hotchkiss, Andes, N. Y., has completed plans and will commence the immediate erection of a two-story automobile service and repair building, 50 x 100 ft.

The American Body Co., 1200 Niagara Street, Buffalo, manufacturer of automobile bodies, is perfecting plans for the immediate erection of its three-story addition, 50 x 50 ft.

Milwaukee

MILWAUKEE, Nov. 28.

One of the most encouraging features of the market is the revival in demand upon foundries, which are steadily getting back to a normal operating basis. Orders cover principally gray and malleable iron, while steel foundries are making some progress as well. In the last 10 days orders have been coming to local shops with relative briskness, which is expected to have a favorable effect upon the machine tool business in the near future. There is a quantity of both new and used equipment to be disposed of before increasing demands will enable manufacturers to place their shops on anything like a normal production basis.

The Super-Traction Truck Co., Fox Lake, Wis., a \$300,000 corporation organized a year ago and now manufacturing six-wheeled motor trucks in leased quarters, is negotiating with the Industries Bureau, Association of Commerce, Fond du Lac, Wis., with a view of establishing permanent works in that city. J. M. Gooding has been appointed chairman of a special committee to conduct investigation. D. G. Stroebel is manager of the Fox Lake concern.

The Jacobsen Mfg. Co., Racine, Wis., which has increased its capital stock from \$50,000 to \$100,000, expects to enlarge its plant during 1922 and at present is increasing its working force nearly 100 per cent. It specializes in the manufacture of a motor-driven lawn mower.

The International Steel Products Co., Hartford, Wis., established four years ago to manufacture mufflers or silencers for motor vehicle engines, is expanding its line of production into the general pressed sheet steel field, including pedestals, floor lamps, and other specialties. It does not contemplate enlargement of its factory at this time, but is buying a small quantity of new equipment from time to time.

The Fort Howard Paper Co., Green Bay, Wis., has let the general contract to the Ludolf M. Hanson Co., local, to design, erect and equip a new paper mill costing \$125,000. It will be 100 x 120 ft., three stories and basement, with a separate power plant and boiler house. Foundations will be laid during the winter and the superstructure erected early next spring. A. E. Cofrin is general manager.

The Peshtigo, Wis., Service Garage, owned and operated by Parlow Brothers, will start work at once on the construction of a one-story addition, 50 x 76 ft., to be used principally for machine work and repairs. Equipment is now being purchased.

The Madison, Wis., Association of Commerce is considering an inquiry from a manufacturer of pneumatic tools and accessories, whose name is withheld, who seeks a new location and specifies accommodations at from 25,000 to 40,000 sq. ft.

The Board of Education of Burlington, Wis., has selected the site for the proposed new high school and vocational training institute and expects to designate architects and engineers at once. The investment will be about \$200,000. F. F. Witter is city superintendent of schools.

The Maribel, Wis., Straw Cutter Co., Henry A. Elmer, president, is starting work on a factory, 40 x 95 ft., one story, for manufacturing attachments for threshing machines and feed cutters. It will cost about \$25,000.

The Phoenix Chair Co., Sheboygan, Wis., will let contracts on Dec. 1 for a four-story brick, steel and concrete addition, 168 x 180 ft., at Twelfth Street and Virginia Avenue. Edward A. Juul, local, is architect and engineer. The work will cost about \$115,000.

The H. & M. Body Corporation, Racine, Wis., has closed a contract with the Hupp Motor Car Corporation, Detroit, for 6500 open and closed automobile bodies for delivery in 1922 in carlots of 34 bodies each, beginning Jan. 1. The plant is operating with a force of 600, but more men will be added at once and by the end of the year 1000 will be employed. Instead of closing for inventory during the latter half of December, the H. & M. company reduced operations the last 10 days of November to facilitate handling of the Hupp order, on which production will start the coming week. The company also is building all bodies for the Mitchell Motors Co., Racine.

The Common Council of Sheboygan, Wis., will take bids soon for equipment of an addition to the municipal garbage incinerator plant, 40 x 65 ft., and to cost about \$25,000 complete. C. U. Boley, city engineer, is in charge.

The Board of Education of Delavan, Wis., has engaged Edward Tough, architect, Madison, Wis., to design a new

high school, 95 x 130 ft., three stories and basement, with manual training department. The estimated cost is \$125,000. Bids probably will be taken immediately after Jan. 1.

The Gulf States

BIRMINGHAM, Nov. 28.

The Birmingham Paper Co., Birmingham, has awarded contract to C. M. Allen & Son, Birmingham, for a one-story plant, 100 x 200 ft., to manufacture corrugated paper boxes, estimated to cost about \$75,000, and of which amount approximately \$40,000 will be expended for machinery. T. M. McClellan is president.

The shipbuilding plant of the Foundation Co., New Orleans, comprising 52 buildings, has been sold to Oliver H. Van Horn, local dealer in machinery and mechanical equipment, for about \$35,100, exclusive of machinery. The yard, with machinery, represented an investment of about \$2,500,000. It is proposed to establish a number of industries at the site.

In connection with rebuilding the portion of its plant recently destroyed by fire, the National Forge Co., Anniston, Ala., will install a quantity of new equipment. The work is estimated to cost close to \$50,000. T. C. King is treasurer and general manager.

Pending the rebuilding of its plant recently destroyed by fire the P. Forschler Wagon & Mfg. Co., New Orleans, will establish a temporary factory at 2831 Burgundy Street. J. A. Maschek is general manager.

The Bogalusa Paper Co., Bogalusa, La., has tentative plans in preparation for an addition to its paper mill, estimated to cost about \$800,000, including machinery. W. H. Sullivan is president.

The Texas Utilities Light & Ice Co., Lubbock, Tex., is planning to rebuild its electric power and ice-manufacturing plants destroyed by fire Nov. 16, with loss estimated at about \$100,000 with equipment.

The Standard Piston Ring Co., Weatherford, Tex., recently organized, has perfected plans for the early operation of a factory to manufacture piston rings for automobile engines and other specialties. E. A. Frantz is president and general manager.

The Humphreys-Mexia Co. and the Humphreys-Texas Co., affiliated, Mexia, Tex., are planning for the installation of new machinery and operating equipment, tanks, etc., at their properties, estimated to cost in excess of \$2,500,000. Col. E. A. Humphreys is president.

The Owens Refinery Co., Ardmore, Okla., is planning for the immediate erection of a new plant at Cameron, Tex., with initial daily capacity of about 1500 bbl. Local offices will be established in First National Bank Building, Cameron.

The Common Council, Quincy, Fla., is arranging a bond issue of \$100,000, the proceeds to be used for the construction of a municipal electric power plant.

An electrically operated pumping plant and re-lift station, estimated to cost about \$103,600, will be constructed by the Board of Directors, Water Improvement District No. 3, Robertson, Neuces County, Tex., in connection with its irrigation project to cost \$300,000 complete. Walton & Arneson, San Antonio, Tex., are engineers.

The Humphreys-Pure Oil Pipe Line Co., Mexia, Tex., recently organized by Col. E. A. Humphreys of the Humphreys-Mexia Co., and associates, with capital of \$1,000,000, is planning for the erection of a new refinery in this section, with initial capacity of about 10,000 barrels per day. New pipelines and storage facilities will be provided to handle in excess of 25,000 barrels of oil per day.

The New Orleans Railway & Light Co., New Orleans, is arranging an appropriation of \$1,000,000, most of which will be used to purchase new electric generating and other power plant machinery. It is proposed to provide facilities to accommodate 2500 new consumers.

The Texas Utilities Co., Plainview, Tex., has plans under way for extensions in its electric generating plant. An addition to the ice-manufacturing plant will also be constructed. J. B. Scott is manager.

The Baltimore Consumers' Supply Co., Montgomery, Ala., a subsidiary of the Gulf Cross Arms Co., has acquired property at Fairfield, Baltimore, Md., as a site for a new lumber mill, with machinery to provide for an output of about 500,000 ft. per month. Plans will be prepared at an early date.

The Alabama Power Co., Birmingham, has disposed of a bond issue of \$5,500,000, the proceeds to be used for general operations, hydroelectric power plant and line extensions and improvements, etc. Thomas W. Martin is president.

Fire Nov. 19 destroyed the electric power plant of the

Corpus Christi Railway & Light Co., Corpus Christi, Tex., with loss estimated at about \$80,000 including machinery. It will be rebuilt.

The George D. Collins Experimental Laboratories, Harborsburg, Tex., are in the market for a used 22 or 24-in. x 8 or 10-ft. engine lathe and a used 36-in. or 48-in. drill press.

The Central South

ST. LOUIS, Nov. 28.

The Missouri, Kansas & Texas Railroad last week placed orders for about 90 per cent of its machine tool requirements. The remaining items on the list of 86 tools, it is said, will be placed this week.

The Western Tie & Timber Co., St. Louis, J. H. Poleman, president, is having plans prepared for a hydroelectric plant on the Current River at Eminence, Mo.

The Unico Motor Products Corporation, 1225 West Fifty-ninth Street, Kansas City, Mo., will soon break ground for a new plant on Rochester Avenue, consisting of a main works, 60 x 224 ft., and one-story foundry, 60 x 160 ft. F. H. Crites, 2136 Bellevue Avenue, has the contract. W. T. Alexander is head.

The Joplin Zinc Products Co., Joplin, Mo., has plans under way for a two-story factory to manufacture zinc shingles and other products, estimated to cost about \$50,000. O. Greenstreet heads the company.

A machine shop and other mechanical departments will be installed in the two-story manual training school addition to be erected by the Board of Education, Muskogee, Okla., estimated to cost about \$60,000. H. O. Valeur & Co., 705 Manhattan Building, are architects.

The King Foundry Co., Eighth and Donphan streets, St. Joseph, Mo., will make extensions and improvements in its welding works, 42 x 200 ft., and foundry, 60 x 80 ft., to cost about \$22,000.

The Board of Education, Independence, Kan., will install a machine and mechanical department in its new three-story high school, 150 x 266 ft., estimated to cost about \$500,000, bids for which will be received up to Dec. 15. A power house will also be erected. N. S. Spencer & Son, Old Colony Building, Chicago, are architects.

The Polar Wave Ice & Fuel Co., Grand and Olive streets, St. Louis, will soon call for bids for a two-story ice manufacturing plant on Gravois Avenue, estimated to cost close to \$500,000, including machinery. H. G. Clymer, Wainwright Building, is architect.

The Republic Photographic Co., Ferguson, Mo., manufacturer of sensitized paper products, will build a power house in connection with its new plant, 77 x 162 ft. and 54 x 250 ft., ground for which has been broken. With machinery, the plant will cost about \$250,000, or about double the amount previously estimated. Albert F. H. Seelig, 2194 Railway Exchange Building, St. Louis, is engineer. Headquarters of the company are at Kansas City, Mo. E. B. Fish is president.

A machine and other mechanical departments will be installed in the two-story and basement junior high school addition, 110 x 134 ft., to be erected by the Board of Education, El Reno, Okla., estimated to cost about \$215,000. Layton, Smith & Forsyth, 701 Southwest National Bank Building, Oklahoma City, are architects.

The Dosch Chemical Co., Louisville, has acquired a building with over 15 acres of floor space for the establishment of a plant to manufacture spraying, dusting and other machinery. The structure will be remodeled and the machinery installation is estimated to cost in excess of \$175,000. Theodore Dosch is president.

The Walsh Motor Car Co., 4919 Delmar Street, St. Louis, has plans nearing completion for a two-story automobile service and repair building estimated to cost about \$80,000. Cornet & Casey, Chemical Building, are architects. W. D. Walsh is president.

A manual training department will be installed in the three-story and basement high school to be erected by the Board of Education, Wellington, Kan., to cost about \$300,000. T. W. Williamson, Central National Bank Building, Topeka, Kan., is architect.

J. C. Perculers, Jr., 603 Wainwright Building, St. Louis, has plans under way for the erection of a one-story machine shop and automobile service works, 45 x 150 ft., at 5152 Southwest Avenue, estimated to cost close to \$50,000, including equipment.

Seattle

SEATTLE, Nov. 22.

John A. Moge, Gresham, Ore., has acquired a site and has plans under way for a one-story foundry to manufacture malleable iron castings.

The Doernbecker Mfg. Co., Portland, Ore., will take bids at an early date for its new six-story furniture manufacturing plant on East Twenty-eighth Street, estimated to cost in excess of \$350,000, including machinery. M. Patterson is company engineer.

Claude Starr, Portland, Ore., is having plans prepared by Sutton & Whitney, Lewis Building, architects, for a five-story automobile service and repair building at Pine and Fourth streets, estimated to cost \$75,000.

The Okanogan Valley Power Co., Oroville, Wash., has preliminary plans under way for the second unit of its hydroelectric generating plant on the Simulkaheen River, estimated to cost in excess of \$300,000, including machinery.

The Northwestern Power & Mfg. Co., New York Building, Seattle, Wash., has filed a permit to construct a hydroelectric generating plant at Lake Crescent and Lyre River, Clallam County, estimated to cost about \$400,000, with machinery.

The N. W. Race Mfg. Co., Billings, Mont., recently organized, has plans under way for a new factory to manufacture valves and other steam specialties, estimated to cost \$50,000. N. W. Race heads the company.

California

SAN FRANCISCO, Nov. 22.

The Santa Fe Railroad Co., Los Angeles, is completing plans for a new steam-operated electric power house at San Bernardino, Cal., estimated to cost about \$200,000. H. S. Wall, mechanical superintendent of coast lines, is in charge.

The Buttress-McClellan Co., Los Angeles, has awarded contract to the Austin Co., Los Angeles, for a new steel fabricating plant, to comprise two one-story buildings, each about 50 x 160 ft., estimated to cost \$100,000, including equipment.

The Tustin Ice & Cold Storage Co., Tustin, Cal., recently organized, has completed plans and will take bids at once for a new ice-manufacturing plant, estimated to cost about \$55,000. Harvey Ritner is president, and C. A. Vance, secretary and treasurer.

Braun, Bryant & Anderson, Santa Monica, Cal., are planning to rebuild the portion of their asphalt manufacturing plant, including power house, recently destroyed by fire with loss estimated at close to \$60,000.

A machine and mechanical department will be installed in one of the group of four high school buildings to be erected by the Board of Education, Pasadena, Cal., for vocational training, estimated to cost \$500,000. Allison & Allison, 1405 Hibernian Building, Los Angeles, are architects.

The American Aluminum Metal Products Co., Burbank, Cal., will break ground at once for the first unit of its new plant, estimated to cost in excess of \$50,000. Richard D. King, 519 Van Nuys Building, Los Angeles, is architect.

A machine shop, electrical department, automobile and other mechanical shops will be installed in the manual training division of the two-story high school to be erected by the Board of Education, San Diego, Cal., estimated to cost about \$300,000. T. C. Kistner, 307 Bancroft Building, is architect.

Canada

TORONTO, Nov. 26.

The machine-tool market has improved considerably the past week and dealers have again become quite optimistic with regard to the early future. Some state that they have closed more business this month than for any other month this year and many buyers who have been inquiring for equipment are beginning to close orders. Small tools have not improved to any extent the past week, but dealers are receiving a steady flow of orders for small quantities. Although one or two concerns have recently let contracts for equipment for an entire plant or addition, no big lists are in the market and sales are confined mostly to one or two machines.

The Kinleith Paper Co., St. Catharines, Ont., is in the market for a 24-in. lathe with 15-ft. bed. It is also contemplating building a new paper-making machine for its own use, and in this event additional equipment will be required.

The Beaver Truck Corporation, Hamilton, Ont., is planning extensive developments there.

Contract for the erection of a plant at Peterborough, Ont., for the Red Arrow Tires, Ltd., has been awarded to John E. Hayes & Son. It calls for the completion of the plant within 120 days.

The Cyclone Fence Co. of Canada, Ltd., Hamilton, Ont., proposes to build a manufacturing plant there.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The quotations given below are for small lots, as sold from stores in New York City by merchants carrying stocks.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb.
Refined bars, base price	2.68c.
Swedish bars, base price	10.00c.
Soft steel bars, base price	2.68c.
Hoops, base price	3.53c.
Bands, base price	3.28c.
Beams and channels, angles and tees	
3 in. x ¼ in. and larger, base	2.78c.
Channels, angles and tees under 3 in. x	
¼ in., base	2.68c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger	2.65c.
(Smooth finish, 1 to 2½ x ¼ in. and larger) ..	2.85c.
Toe calk, ½ x ¾ in. and larger	3.25c.
Cold-rolled strip, soft and quarter hard ..	6.25c. to 7.25c.
Open-hearth spring steel	4c. to 6c.
Shafting and Screw Stock:	
Rounds	3.88c.
Squares, flats and hex	4.38c.
Standard cast steel, base price	12.00c.
Extra cast steel	17.00c.
Special cast steel	22.00c.

Tank Plates—Steel

¼ in. and heavier	2.78c.
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Sheets

Blue Annealed

	Per Lb.
No. 10	3.53c.
No. 12	3.58c.
No. 14	3.63c.
No. 16	3.73c.

Box Annealed—Black

	Soft Steel C. R., One Pass Per Lb.	Blued Stove Pipe Sheet, Per Lb.
Nos. 18 to 20	3.80c. to 4.05c.	.....
Nos. 22 and 24	3.85c. to 4.10c.	4.50c.
No. 26	3.90c. to 4.15c.	4.55c.
No. 28	4.00c. to 4.25c.	4.65c.
No. 30	4.25c. to 4.50c.	.....
No. 28 and lighter, 36 in. wide, 10c. higher.		

Galvanized

	Per Lb.
No. 14	4.10c.
No. 16	4.25c.
Nos. 18 and 20	4.40c.
Nos. 22 and 24	4.55c.
No. 26	4.70c.
No. 27	4.85c.
No. 28	5.00c.
No. 30	5.50c.
No. 28 and lighter, 36 in. wide, 20c. higher.	

Welded Pipe

Standard Steel	Black	Galv.	Wrought Iron	Black	Galv.
½ in. Butt... —55	—40		¾ in. Butt... —30	—13	
¾ in. Butt... —60	—46		1-1½ in. Butt. —32	—15	
1-3 in. Butt.. —62	—49		2 in. Lap.... —27	—10	
3½-6 in. Lap. —59	—45		2½-6 in. Lap. —30	—15	
7-8 in. Lap... —55	—41		7-12 in. Lap... —23	—7	
9-12 in. Lap.. —54	—40				

Steel Wire

	Per Lb.
Bright basic	4.00c.
Annealed soft	4.00c.
Galvanized annealed	4.75c.
Coppered basic	4.50c.
Tinned soft Bessemer	6.00c.

* Regular extras for lighter gages.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	17¼c. to 17½c.
High brass wire	17¼c. to 17½c.
Brass rod	14¼c. to 15 c.
Brass tube, brazed	26 c. to 27½c.
Brass tube, seamless	18 c. to 19 c.
Copper tube, seamless	21 c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 21½c. per lb. base.	
Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.	

Tin Plates

Bright Tin	Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20	Coke—14-20	Primes	Wasters
			80 lb...	\$6.05	\$5.80
			90 lb...	6.15	5.90
			100 lb...	6.25	6.00
	IC.. \$10.25	\$8.75	IC...	6.40	6.15
	IX.. 11.50	10.25	IX...	7.40	7.15
	IXX.. 13.25	11.75	IXX...	8.40	8.15
	IXXX.. 15.00	13.50	IXXX...	9.40	9.15
	IXXXX.. 16.50	15.25	IXXXX...	10.40	10.15

Terne Plates

	8-lb. Coating 14 x 20
100 lb.	\$7.00
IC	7.25
IX	7.50
Fire door stock	10.00

Tin

Straits, pig	32½c.
Bar	39c. to 41c.

Copper

Lake ingot	16 c.
Electrolytic	15¼c.
Casting	15¼c.

Spelter and Sheet Zinc

Western spelter	6½c. to 7c.
Sheet zinc, No. 9 base, casks	11c. open 11½c.

Lead and Solder*

American pig lead	5¼c. to 6¼c.
Bar lead	6¼c. to 7 c.
Solder, ½ and ½ guaranteed	22¼c.
No. 1 solder	20¼c.
Refined solder	17¼c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	80c.
Commercial grade, per lb.	40c.
Grade D, per lb.	35c.

Antimony

Asiatic	6½c. to 6¼c.
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Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	29c. to 31c.
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Old Metals

The market continues strong with an upward tendency. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy and crucible	11.00
Copper, heavy and wire	10.50
Copper, light and bottoms	8.25
Brass, heavy	5.50
Brass, light	4.50
Heavy machine composition	8.00
No. 1 yellow brass turnings	5.25
No. 1 red brass or composition turnings	6.75
Lead, heavy	3.75
Lead, tea	2.50
Zinc	2.00

